HISTORY
OF THE
PROPAG.
& IMPROV.
OF
VEGETABLES

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SHARROCK, R.

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EDMUND WORRALL,
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THE HISTORY OF THE Propagation & Improvement OF VEGETABLES

By the concurrence of

Art and *Nature*:

Shewing the ſeveral ways for the Propagation of Plants uſually cultivated in *England*, as they are increaſed by Seed, Off-ſets, Suckers, Truncheons, Cuttings, Slips, Laying, Circumpoſition, the ſeveral ways of Graftings and Inoculations; as likewiſe the methods for Improvement and beſt Culture of Field, Orchard, and Garden Plants, the means uſed for remedy of Annoyances incident to them; with the effect of Nature, and her manner of working upon the ſeveral Endeavors and Operations of the ARTIST.

Written according to OBSERVATIONS made from Experience and Practice:

By *Robert Sharrock*, Fellow of *New Colledge*.

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TO THE

HONORABLE
ROBERT BOYLE *Eſq;*

The moſt worthy pattern of true Honor,

AND

Learned Promoter *of true Science.*

SIR,

IT is a ſaying in the Civil Law, *That a thing which is any Mans own, cannot be made more his by any new Act or Deed:* The conſequence of which, is, that the Dedication of this Piece to you will be meerly nugatory, ſince by all right it is already yours. For it is not long ſince I imagined no more being either Author, or Compiler of any matter on this ſubject, then of doing any other thing which I have neither fancy nor fitneſs to. But you were pleaſed to judge me able, and (which obliged me to this task) to propoſe it unto me as your deſire that I ſhould make an eſſay of that ability, in writing ſomewhat even on this ſubject, that might be of Philoſophical and common uſe. To have queſtioned your judgement herein, might have ſtained me with too much arrogance, and to have been carelesse of your pleaſure, with unworthineſs and want of good Manners. Remembring therefore thoſe reſpects I owe to Honor, Learning, and ſuch perſons as ſtudy its advancement and promotion, I could not deny this poor endeavor, the product of which ariſing originally from your own act, I thought fit ſhould be delivered over to your pleaſure, ſince to you, as its primary cauſe (which is its prime commendation) it ought to belong.

And Sir, If it may not be troubleſome unto you to receive ſome brief account of this action, and the Fortunes which happened to me in purſuance of your ſatisfaction therein, you will give me leave to acquaint you, that it having been your Honors expreſs deſire, that this Piece might extend as far, and be as comprehenſive and full, as my preſent Experience, Knowledge, and Recollection of the matter of Vegetable Propagation ſhould permit: I gave my ſelf the trouble to run over with my eye, all Books I could procure of theſe ſubjects, not intending to truſt any, but thereby to be put in mind of the particulars, concerning which, I had no reaſon to have a Regiſter ready in my head. Here firſt my fortune was to finde a multitude of monſtrous untruths, and prodigies of lies, in both Latine and Engliſh old and new Writers, worſe in their kinde then the ſtories in Sir *Iohn Mandevel's* Travels, or in the Hiſtory of Fryer *Bacon* and his Man *Miles*; or elſe what may be more ridiculouſly removed not onely from truth, but from any ſemblance thereof. And which moved me moſt at this very ſeaſon, when we eſteemed the World to be now awaked, I found in the Shops Authors newly ſet forth (I hope againſt their own wills) who ſeriouſly profeſſed to have *made a ſelect choice of Experiments* of this nature, *and to report nothing, but what from obſervation and experience they have certainly found true*, yet deſerving not to have the credit of *Wecker* and *Porta*. Profeſſions in ſuch Papers, which ſeem to me at no time proper, but when the perſons credits, together with their Books, are joyntly to be ſet to ſale. You eaſily believe that I am not free to follow theſe Examples, for then, firſt, I muſt abuſe your Noble Name, by inſcribing it to a moſt unworthy Diſcourſe, and then (which is too common a fault) traduce as many Readers, as ignorance and ſimpleneſs of nature hath made credulous.

But as to thoſe Authors, in whoſe relations I found any thing of truth, I have done them this right, That where ever I could relate an Operation or Experiment in their words, with truth and fitneſs, I ſpared to coyn new (deſiring to ſupplant no Author in his credit, nor to purloyn his reputation) though I had learned the truth of the ſame thing from the teſtimony of my eyes: Having indeed ſome quarrel at the faſhion of ordinary Writers, who ſtudy in nothing to benefit Learning, but by giving new words to old matter.

I have left out none of the Heads propoſed in the Catalogue, which I preſented you with, a year ſince, except the laſt, which you deſired might ſhew the methods and ways of keeping uſeful Vegetables without putrefaction, and the preparing them with their ſeveral parts and products for humane uſe. This at preſent I thought neceſſary to forbear, for I found the matter too much for one Chapter, and my leiſure too little to make a Book thereon: nor durſt I eſteem my Obſervations ſuch, as might enable me to write an adequate Treatiſe on that ſubject, which reaches in compaſs the largeſt, and as I firmly believe (however the Animal and Mineral Kingdom abound with great and potent Medicines) not the worſt part of the *Pharmacopœa*, and many particulars beyond; but rather think fit to employ my ſelf ſome more years in the Experience and Practice of Preparations, and take the pains of collecting and trying ſuch intelligible and probable proceſſes as ſhall come to my hand, either reported heretofore, or uſed now, eſpecially in our Nation, for fitting matters to Alimental, Medical, and Mechanical uſe, before I ſhall imagine to have the leaſt hand in that Hiſtory, which may as well be learn'd by ſuch as are concern'd to know it, from Modern Diſpenſatories, and other novel Writers. But the perfection of that Hiſtory, with correction of proceſſes capable of amendment, is, in my eſtimation, a deſign and work worthy of the Care, Patronage, and Governance, and fit to be carryed on by the intereſt, if too tedious, for the Pen and Pains of your Honor.

As to the form and compoſure of matter under thoſe Heads, I muſt make it a particular buſineſs to beg your pardon; for I finde it even in my own jndgement exceeding rude, and it could be no otherwiſe, when the Reviſe of the Preſs, was, for a great part, the firſt review made of my own Writing; and indeed, the whole piece in every part ſeems deſtitute of beauty, and without any thing of great worth, value, or nobleneſs. For I finde, that the operations themſelves, and other matters that do belong to the ſubject in hand, and ſo capable to come under this Hiſtory, are for the moſt part common, and devoid of curioſity: Nor durſt I embelliſh their plainneſs with Stories taken from our Learned and Profound Writers of Natural Magick, becauſe I intended, as no very imperfect, ſo likewiſe a true Inventary of what the power of man, at this preſent time, on this ſubject, is, with the Co-operation of Nature, able to produce: For theſe reaſons, and perchance becauſe of another piece then under my hand, to which I had more propenſe affections. I was exerciſed in this writing, not without ſome reluctancy and untowardneſs of minde; and it ſurely had proved to me a piece of meer drudgery, had not the hope of giving you ſatisfaction, and making this a teſtimony of my obeyſance and humble ſubmiſſion to your Judgement and deſires inſpirited me, and let a lightſomneſs into my thoughts. What I have written, I ſhall not commend, by any Prefaces, to any Reader, though I ſhall give him here ſome things new, and of my proper Obſervation: I know that many, by their own Intereſt and (that great power) Temporal Profit, will be tempted to give it the reading. Neither ſhall I, in imitation of ſome Modern Alchymiſts, for oſtentation, bid them goe; and by the improvement (which I hope may be ſome to moſt Readers) be charitable to the poor: Hoping, that for Gods ſake, they will rather (as they are bound by Obligations infinitely more high) be thereto moved; nor need I excuſe my ſelf to them for any deficiency in this Writing, you having ingaged your ſelf to be the Proprieter thereof, and by your acceptance of this poor Piece, greatly obliging,

SIR,

Your Honors unfeignedly Devoted in all humble and affectionate obſervance.

R. Sharrock.

To the Author on his two late publiſht Pieces, *The Hypotheſis of the Law of Nature*, and, *The Hiſtory of Propagation.*

SIR,

Of late to th' privy Chambers of the minde
You led's, to which a glimmering ray had ſhin'd
From God th'Abyſs of light; but much adoe
There had been made to ſtop that ray out too.
Here 'twas you drew a Curtain, and we ſaw
The ſacred Tables of our Natures Law;
The frame of which was made of poliſht glaſs,
Where each Soul, fair and foul, might ſee its face;
And there hung Juſtice Scale, ready to weigh
All actions, good and bad, juſt as they lay:
Juſtice her ſelf we ſaw not, for 'twas ſed,
That long agoe her Ladyſhip was fled.
But Duties way-marks, up and down there ſtood,
And the forgotten bounds of Ill and Good.
Much Furniture beſides; all by th'abuſe
Of new invented faſhions, out of uſe.

Now Sir, you'r walkt abroad, you teach to Sow,
And Plant, and Graft, and ſhew how all things grow
By th'beſt improvements; how to harneſs Art
With Nature, and to make her draw her part:
How Nature varies all her Scenes, and makes
Things orderly and uſeful for our ſakes.
You trace her ſteps, and make us plainly ſee't,
To be great Providence that guides her feet:
Thus when at home, and when abroad, you can
Contrive to honor God, and pleaſure Man.

Will: Parker, Scholl: of *New Coll.*

A Gratulation unto the Author, upon his Hiſtory of the Propagation of Vegetables.

WEe'l blame Antiquity no more, that ſhe
Has ſwallowed *Solomons* Phytology ;
Thoſe long-loſt ſacred Relicts you revive,
Limning the nature of each Vegetive.
Natures moſt hidden ſtore, you open ſet,
As if y'were keeper to her Cabinet.
Mid'ſt Plants and Trees you muſe, thence we confeſs,
England again hath got her *Druides*:
Your Garden, a new Academy ; can
Be made *Lycæum*, or turn'd *Vatican.*
So the fam'd Epicure, long ſince did try
To make his Garden teach Phyloſophy ;
Where he, by *ſhufling* Atomes, repreſents
All changes ; a *Cator* of Elements
He then *laid out*, and (what was yet more high)
Boldly *diſcarded* Heavens Deity.
You ſlight that *play*, and ſhew there's no *ſequence*,
No *ſuit of things*, without a Providence.
Each Herb's engraven'd with a Heavenly Frame,
Like th'*Hyacinth* enſtamp'd with *Ajax*'s name :
As a myſterious Rabbin's wont to ſpell
The name of God, from a dark Syllable :
So you read him in's ſecrets works ; Each clod
Speaks th'God of Nature, makes not Nature God.

May theſe your Vegetives, thus ordered, prove
A *Vocal Forreſt*, or *Dodona*'s *Grove.*
To ſpeak your worth, that ſo our non-plus'd cry
May be aſſiſted by *Dendrology.*

Ed: Spencer Fell: of *N.C.*

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ERRATA.

Page 8. col. 2. l. 17, r. *Scorzonera.* p. 10. l. 5. are but young p. 11. l. 15. *properata ſatio*, p. 27. l. 6;8,9. r. Serotine, p. 33. l. 21. r. ſoe that to bear Seed yearly, is general to all, unleſs p. 61. l. 3. and I am well contented, p. 94. l. 22. as poſſible p. 117. l. 20. adapted p. 149. l. 18. Veſtments.

THE HISTORY OF *Artificial propagation of Plants.*

CAP. I.

Of Propagation by Seed.

Num. 1. *Of Propagation of Vegetables in general, with a Preface to the Diſcourſe.*

THe Illuſtrious and Renowned Lord *Bacon*, in his Diſcourſe concerning the advancement of Learning, reckons it among the Deficients of Natural Hiſtory, *That the Co-operation of Man, with Nature in particulars, hath not been obſerved; and that in thoſe Collections which are made of Agriculture, and other manual Arts, there is commonly a neglect and rejection of Experiments, familiar and vulgar, which yet to the interpretation of Nature*, and which I ſhall adde, general profit, *do as much, if not more conduce, then Experiments of a higher quality.* The ſame noble Perſon, in his partition of Philoſophy, complains of the want of an Inventary of what in any ſubjects by Nature and Art is certainly, and may be undoubtedly wrought. I believe his Lordſhip hath had many of his minde in former, has now, and is likely to have in future ages; for amongſt thoſe few Writings extant on theſe Subjects, ſome prove altogether uſeleſs, as being ſo full of their natural Magick and Romantick Stories, that we know no more what to credit in thoſe Relations, in the Natural, then what in civil Hiſtory we may believe of King *Arthur*; *Guy* of *Warwick* in ours; or of *Hector* and *Priam* in the *Trojan* Story: Others elevated in their Fancies, write in a Language of their own, addreſſing their Diſcourſe to the Sons of Art, ſpeaking rather to amuſe, than inſtruct, and prove like blazing Stars, that diſtract many, and direct few.

Many of thoſe who would write for Univerſal Inſtruction, either know the things that might make up the matter of their Hiſtory, but want the skill to draw up ſuch an Inventary, as his Lordſhip requires, as common Tradeſmen and Artiſans; or elſe indeed are learned enough to draw up the writing, but ſtand aloof from the knowledge of moſt of the particulars therein to be ingroſt; which is the ordinary caſe of us, ſuch of us as have pretenſions to Scholarſhip.

I being neceſſitated by my obligations and reſpect to a Perſon truly Noble, to give ſome account of the particular effects of Man, co-operating with nature, in the matter of our Engliſh Vegetables, as they are improved by Husbandmen and Gardiners, deſire to undertake no more, but to give a ſincere endeavour, That the way of the Artiſt be ſet down, and the effect of Nature thereon; in the firſt of which, I intend my directions ſo plain, as if appointed for the inſtruction of ſome Artiſts rude and untaught Apprentice: and the ſecond's, if not ſo homely, yet as eaſie and evident, being a little diſguſted with any thing intended for the uſe of Philoſophy, when overgarniſhed with Rhetorical Tropes, which like Flowers ſtuck in a Window for whatſoever intended (either cheat or ornament) certainly create a darkneſs in the place. *Behemenical*, *Paracelſian*, and ſuch Phraſe as many Alchimiſts uſe, I muſt for the ſame reaſon avoid.

In the drawing up the Inventary, I will ſtudy that t may be true in all parts, and not to mingle, accord-ng to the example of *Pliny*, *Weeker*, *Porta*, and many more, both Latine and Engliſh Writers, any falſe elation, without its diſtinguiſhing Character; and f it be not perfect, it ſhall be for want of skill, or preſent remembrance of particulars.

The end of the Artiſt is to Propagate and Improve: To propagate, is to multiply the individuals of each inde: And to improve, is to bring them, being propagated, to a more then ordinary excellency and oodneſs: The ways of increaſing the particulars of ach kinde, are, 1. By Seed, 2. By off-ſet, taken om a Mother-Plant. 3. By laying the Branch of a rowing Plant down into the Earth. 4. By bearing p a Soil to it. 5. By Stems ſet without roots. And ſtly, By the various ways of grafting and inſi-ons.

Concerning all theſe, as likewiſe the preſervation nd melioration of things propagated, I ſhall endea-or to enumerate what Plants may be increaſed by ach of theſe ways, and to ſhew how the operation each may be performed, and what the product is

that

that by nature thence ordinarily enſues : Definitions are hopeleſs in this matter, uſeleſs too, and it might be harmful : If I ſhould define Sowing, to be the caſting of Seed into the Earth, in ſuch maner, and at ſuch time, when in the ſurface of the bed the earth would ſo ferment, as might be proper to the explication and further germination of the Seed and increaſe of the Plant, there might a world of controverſies ariſe about the particulars therein contained ; and yet all that is there would be uſeleſs, till the particular Plants, and the maner of the operation, and time required to the ſowing of their Seeds be firſt declared : I ſhall therefore wave all ſuch endeavors, and haſten to what may rather prove for uſe than pomp.

N. 2. *A Catalogue of Plants that may be encreaſed by Seeds.*

Aconite.
F. Adonis.
Alliſſanders.
Alkanet.
Alaternus.
Alliaria.
Almonds, the bitter from our Engliſh Fruit, ſerving for his own kinde, or to make ſtocks for Aprecots and Peaches.
Ammi.
Amaranthus.
Angelica.
Anemones.
Apricots.
Aparine.
Apple-Trees of all ſorts.
Apples of Love.
Arſemart.
Armerias.
Archangels.
Ariſtolochia.
Aſh.
Aſparagus.
Aſphodels.
Avens of all ſorts.
Balm Apple.
Balſamina.
Baſil.

Balm.
Barberies.
Bay-Trees.
Beech.
Beans.
Bears-ears.
Betony.
Bell-flowers.
Beets.
Biſtort.
Bitter Almonds.
Blite.
Blew-bottle.
Bloodwort.
Bryonies.
Bulbous Violets.
Burrage.
Bugloſſe.
Burdock.
Burnet Saxafrage.
Burnet.
Burrs.
Buckthorn.
Bullets of all ſorts.
Cabbage Plants.
Campions.
Carnations.
Calamint.
Camomile.
Caucalis.
Carrots wilde.
Carrots.
Caraway.
Carduus Benedictus.
Centory
Celandine.
Chickweeds.
Chondrillas.
Chervil.
Cherries.
Cheſnuts.
The *Cornelian Cherry.*
Cichory.
Citrulls.
Ciches.
Claries.
Coleworts.
The Seed of *Clematis*, but it comes not up till the ſecond year.
Coleflower.
Corn of all ſorts.
Coronopus Ruellii.
Comfrey.
Corianders.
Columbines.
Convolvulus major, minor, and other Bind weeds.
Cornſallet.
Coronopus.
Moſt ſorts of *Cowſlips.*
Crown Imperial.
Cranes-Bills.
Crowfoot of moſt ſorts.
Cucumbers.
Cumin.
Cyclamens.
Cypres from out-landiſh

ſeed.
Dandelion.
Dames Violet.
Some *Dayſies.*
Diers Weed.
Dittander.
Divels bit.
Dittany.
Dill.
Docks.
Dogs-bane.
Earth-nut.
Egrimony.
Elecampane.
Endive.
Epatica's.
Eupatorium cannabinum.
Evergreen Privet.
Ewe.
Feverfew.
Fennel flowers.
Fennel.
Fenugreek.
Figwort.
Fig-trees.
Fibberds.
The *Firre-Tree.*
Some *Flags.*
Flowers-de-Luce.
Flos Adonis.
Flaxes.
Fleabane.
Fluellens.
Foxgloves.
Frittelaries.
French Mallows.
Fumitery.
Garlick.
Garden creſſes.
Germanders.
Ginny.
Gilly-flowers.
Gourds.
Moſt of our Engliſh *Graſs*; to this end, Husbandmen uſe Hay-duſt (as they call it, in which lie the Seeds of their graſs) to ſow upon ſuch Grounds as they mean to turn from Fallow into Paſture, or where they would have the Graſs grow thicker.
Grain of all ſorts.
Groundſel.
Groundpine.
Gromwell.
Hawkweeds.
Hartwort.
Hawthorn.
Haſelnuts.
Henbane.
Hemp.
Hellebores.
Hercules his all heal.
Hyacinths.
Horſe-radiſh.

Horned-Poppy.
Hony-wort.
Horehounds.
Hounds Toungues.
Holyoke.
Honyſuckles.
Holly or Holme.
Hypericum.
all *Hyſſopes.*
Indian Pepper.
Ironworte.
Juniper.
Kidney-beans.
Knapweed.
Knot-graſſe.
Ladyſmocks.
Lamb-lettuce.
Lark-ſpurs.
Lavander.
Langdebeefe.
Leeks.
Some *Lillyes*, though but few.
Lychnis Calcedonica.
Linum umbellatum.
Lovage.
Lupines.
Marjoranes of all kinds.
Mandrakes.
Maſtique.
Common *Marygolds.*
Mallows.
French and African Marigolds.
Marſhmallowes.
Maſterwort.
Maple.
Malacotones.
Melons.
Melilot, and its kinds.
Medlars.
Mercuries.
Molyes.
Motherworte.
Muſtard.
Muſcipula.
Mulleines.
Mulberries by ſeed from hotter climates than our own; for our heat ripens not the ſeed.
Mirtles likewiſe.
Narciſſes.
Dead-Nettles.
Stinging Nettles.
Noli-me-tangere.
Nightſhades.
Nigella.
Oke.
Onions.
Some of the *Orchis* or ſtones.
Orach.
Orpines.
Paronychia.
Pancies.
Peucedanum.
Parſley.

Parſnips.
Panax Herculeus.
Pellitory.
Pennyworts.
Peonyes.
Peaſe.
Peaſe everlaſting.
Pears.
Peaches.
Periclimenum.
Pinks.
Pimpernel.
The *Pitch-tree.*
Plums.
Plantains.
Wild and garden *Poppyes.*
Pondweed.
Pompions.
Primroſes.
Ever green Privet.
Pulſatillas.
Purſlane.
Quinces.
Radiſh.
Ragworte.
Rampions.
Radix-cava.
Reeds.
Ribwort.
Roſemary by Out-landiſh ſeed, ſometimes by our own.
Roman Nettles.
Some *Roſes*, the Flower being not gathered, but left to ſeed.
Rocket.
Ruſhes of many ſorts.
Rue of all ſorts.
Some of the *Saffrons*, and *Mede Saffrons*, whoſe ſeed lyes under the earth.
Satyrions.
Savory.
Sabina baccifera.
Scorpion graſſes.
Scurvey graſſe.
Scorodonia.
Scabiouſe.
Scorzoneca, but it comes up with ſome difficulty.
Seſeli æthiopicum, or *Hart-wort.*
Seſamoides,
Shepheards purſe.
Skirrets.
Sloes.
Smalladge.
Sneezewort.
Snapdragon.
Sowthiſtle.
Sorrels.
Spiderwort.
Spinach.
Spurges of many kinds.
Spignel.
Stitchwort.

Starreflowers.
Stockgilliflowers.
Starrewort.
Flowers of the Sun.
Sword-flags.
Swine-creſſe.
Swallow-wort.
Sycamores.
Tarragon.
Teaſels.
Terræ-glandes.
Thorney Apples.
Thorough-wax.
Thyme, both the Winter and Summer ſort.
Thiſtles.
Tabacco.
Thlaſpies.
Toad-flaxes.
Tragopogon.
Trefoile, and its kinds.
Tulips.
Turnips, and all its wilde kinds.
Tutſan.
Venus Looking-glaſſe.
Vervain.
Vetches.
Violets.
Vipers-graſſe.
Virgine-bower.
Umbilicus-Veneris.
Vines from outlandiſh ſeed.
Water-betony.
Water-lilly.
Wallnuts.
Winter-creſſe.
Winter-cherries.
Willow-weeds.
Woolfs-bane.
Wormwood.
Woodroof.
Wood-ſorrel.
Woad.

There is a great controverſie concerning *Harts-tongue*, *Maydenhair* of divers ſorts, *Scolopendrium*, *Fernes*, and other Plants, whoſe property is to have the back of the leaf lined with a brown duſty ſubſtance, whether this be a ſeed, or onely particular mole, and character of Plants of that nature.

I dare not disbelieve this, when perfectly ripe, to be a true ſeed, becauſe divers, very experienced perſons (as Mr. *Bobart* particularly) affirm, that they have ſeen the ſmall Plants, or Seedlings at a diſtance all round the Mother-plant grow up as is ordinary from ſhed ſeed of other plants, and by *Miſcroſcopes*, the likeneſſe of this duſt to other ſeeds is apparently ſeen.

N. 3. *The Seaſons of Sowing.*

Firſt, the moſt naturall time of Sowing is that which Nature it ſelf followes (*viz.*) when the ſeeds of their own accord fall into the ground.

At this ſeaſon may be ſowen all ſtony ſeeds that can endure the Winter, as Cherries, Plums, Peaches, Apples, Peares, likewiſe all Nuts, Buckthorne, Aſh, Oke, and moſt wild Engliſh Plants, though they may as well be ſowed any time before the Spring.

The ſeed of hot, and ſweet hearbs, as Thyme, Savory, Marjerome of ſome kinds, and other hot hearbs, if they get any reaſonable ſtrength and growth before the froſts, doe well enough; alſo Angelica ſeed, Scurvey-graſſe, and the ſeed of Bears-ears, Aniſeed, Fritellary, Crocus; and, for ought I know, all the reſt of Bulbous-rooted flowers: So Tulips and Anemones thrive beſt, and come ſooneſt, being ſowed after the ſeeds are gathered, or in Autumn: For many *October* does well, but care muſt be had to keep tender Plants from Froſts and the violence of Winter weather, when they but young from the ſeedlings. If you doubt the nature of any ſeed, divide your quantity, and ſow ſome of it in the Spring, ſome before the Winter.

At this time alſo muſt be ſowed divers Plants, for that by experience 'tis found, that being ſowed in the Spring they will not grow at leaſt not that year:

Of

The Exemplification of the Operations by the Figure.

a Denotes the ordinary cutting of the Bark for Inoculation.

b b The ſides of the Bark, lifted up for the putting in of the Shield.

c The Shield taken off with the Bud, which lies under the Stalk of the Leaf cut off.

f n The Shield put into the Stock to be bound up.

d The Bark cut out in an oblong ſquare, according to another uſual way of Inoculation.

g The Shield cut out for the fitting the diſ-barked ſquare.

m The ſame Shield put into the Stock.

ſ A variation of the fore-mentioned way, by cutting off the upper part of the oblique ſquare, and binding the lower part down upon the Shield.

o The Shield ſo put in to be bound up.

e Another variation by ſlitting the Bark, that the Bud and Leaf may ſtand forth at *e*, and the Bark ſlit be bound down upon the Shield.

h A croſs cut for Inoculation.

i The ſame croſs cut lifted up in this Figure, ſomewhat to big

k The Shield cut off to be put therein.

p The Shield put in.

g or *q* The cut of the Cyon or Stock for whip-grafting.

r 7 The cut of Cyon and Stock for Shoulder-grafting.

s The cut of the Cyons, and ſlit of the Stock for Grafting in the cleft.

x The Stock ſet for Ablactation or approach.

u The Cyon of the Branch for the ſame operation.

1 2 The Branch that is to be taken off by Circumpoſition.

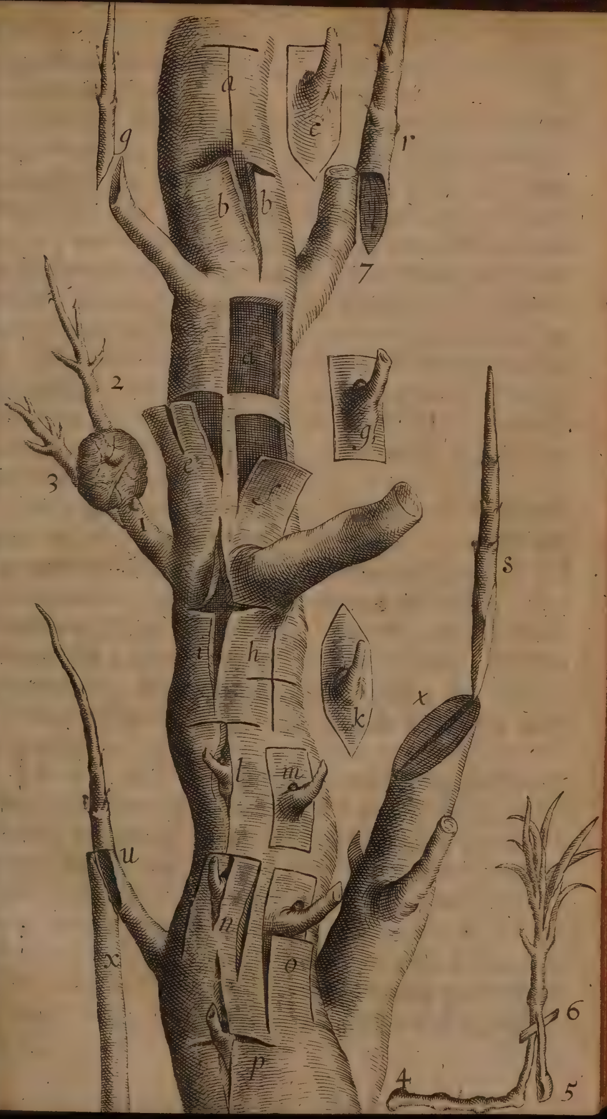
3 The Branch that bears up the mould to the diſ-barked place.

4. The Branch of a Carnation to be laid.

5. The joynt where the ſlit begins.

6. The next joynt where the ſlit is propped open, with a peice of a Carnation Leaf put in.

Adde this at the 70th Page.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Of this kinde Myrrhis, or ſweet Chervill, and all Rubarbs, which eaſily grow then, but faile being ſowen in the Spring.

The miſtake of the time has made ſome admire, that when they with care had ſowen Angelica ſeeds ſeverall times together, this never grew; on the contrary, the Seed being ſhed would grow in any place, never ſo uncouth or ſtony; nay even carried away by the water, would grow wherever it was lodged in the banks, and that well and luſtily; whereas the reaſon of the difference was in the ſeaſon, for the laborious Artiſt kept the ſeeds till Spring was his hindrance, whereas better inſtructed Nature would have committed them to the earth many months ſooner. 'Tis a true Proverb, *properata ſatio ſolet ſæpe decipere, ſera ſemper.*

Some ſeeds are ſowen at the breaking of the Froſt, and the very firſt beginning of Spring, and that upon a hot bed, for the greater ſecurity and ſpeed of the Plant to be propagated: So the early Radiſh, the Senſitive Plant, Maracoc, Balm Apples, French Marygolds, Muskmelons, all Cucumbers, African Marygolds, the Marvail of the world, the Indian Creſſe, or yellow Larksheel, Lettices that they may be had early.

The hot Bed is made with horſe-dung laid four, five, or ſix foot high, and of the ſame breadth commonly, increaſing or diminiſhing the quantity of the dung (which uſes to be freſh, as it comes from the ſtable, mingled with ſtale Litter, Hay, &c.) according as you would have the heat greater or leſſe, upon which bed of dung you lay fine mould, five fingers breadth in deepneſſe or thereabouts, compaſſing it round with hay-bands which keep the dung together, and hinder the ſteaming out of the heat by the ſides; then ſtaking it up with ſtakes, and putting bended ſticks in the manner of a very low roofe to hold up tilts that are put to ſecure the Plants, the hot bed is perfectly finiſhed. Thoſe that uſe Cap-glaſſes, or Caſements made to lye upon a frame over their beds, neverthelesſe muſt uſe, though not tilts, yet covering with ſtraw, litter, or the like.

Aſparagus and Chervil are beſt ſown in Winter before Chriſtmaſſe, or ſhortly after, and in the beginning of Spring without any hot bed. In *February*, or afterwards, are ſown Parſnips, Leeks, Onions, Aniſeeds, Carrets, Radiſh, Spinage, Larks-ſpurs, Marygolds, Cærefolium, Corn-ſallet, and with the firſt of theſe the Rounſeval peaſe.

Colliflowers and Cabbages in the middle of *February*, Muskmelons ſomewhat after, or then for a venture. 'Tis obſerv'd by all I have enquired of, that the leſſe of the Winter the Cabbage or Colly-flowers feels, the more ſubject 'tis to Caterpillars. In *March* or *April* (or according to ſome with us, from the beginning of *February*; or, if the Froſts breake, any time in *January*) Carrot, Radiſh, Tobacco, Fennel, Creſſes, Skirrets are ordinarily ſowen.

In *April*, Marjerome, Baſil, Coleflowers; for by often tranſplanting and care you may have Coleflowers from ſeed, ſowen in the Spring, though it be very far gone even to *June* or *July* the ſame yeare, Pincks, Armeriaes, Convolvulus, Kidney-beans, Lupins, Hyſſope, Lavander, Stock-gillyflowers, Thyme, Hemp.

About the latter end of *April*, Purſlane, Clove-gilliflowers, Carnations, Baſil, Roſemary.

About *Midſummer* ſow the early Peaſe, to be ripe ſix weeks after *Michaelmaſſe*.

Note that our Gardiners, though there be ſome perill, chuſe to ſow early, becauſe they have much advantage by all ſorts of forward commodities; ſo Turnips ſowed early, many run to ſeed, yet one good then, is worth three at another ſeaſon. The ſame may be ſaid of Peaſe and Carrets, which by cold are ſpoyled many times; yet it is obſerved by ſome, that oftentimes, whether by difference of ground, or other accident, the Bean latter ſowed wil overtake the former, and ſo in ſome ſorts of Peaſe.

Many ſeeds are beſt ſowen about *Auguſt*, ſo Turnips, and the black Radiſh, for a peculiar reaſon; which is, being ſowen ſooner, they are apt to run up to ſeed before Winter, and not to fil the root at all. Onions for winter proviſion, Lettice and Corn-ſallet for the ſame occaſion; Spinage too, alwaies upon that account, though otherwiſe they may be ſowen with the firſt. Nay, our Gardiners here in *Oxford* ſow Turnips in *April*, and ſo forward till the Winter.

Cabbage plants are ſowed commonly about *Auguſt*; and the firſt Coleflowers, that they may before Winter be ſo grown, as to be tranſplanted at greater diſtance, ſo to abide till the Spring. I have known ſome, when froſt has ſpoyl'd the winter Cabbage-plants, to have furniſhed themſelves from plants raiſed in the Spring upon a hot bed.

Many ſeeds muſt be gathered a little before they are throughly ripe with the ſtalkes on which they grow; for ſhould it abide until the full maturitie in the Garden, by wind and weather great part of the ſeed would be ſhed, which will eaſily perfect its ripeneſſe as it lyes cut upon its ſtalk, being laid any where within doore upon a cloath or mat where the Sunne comes. Of this kind is Lettice, and moſt of thoſe ſeeds that ariſe from the ſtock with a woolineſſe.

There are many Plants that will grow in all times of ſowing, and therefore are ſowen many months, one after another; ſo Radiſhes, and Spinach, and Peaſe; which are ſowen with the firſt in the Spring; and ſo month after month till Autumn. Thoſe Lettice which abide the Winter are wont to be tranſplanted to Cabbage in the Spring, even as Cabbages are with admirable ſucceſs.

Our Gardiners, that they may have Cucumbers to ſel one under another, plant them in hot beds from *February* even till *May*.

Peaſe are ſowen from the beginning of *November* (or by ſome a fortnight before, though with ſome danger of the biting froſt) and ſo forward til after *Shrovetide*.

Rounſevals, if ſowed never ſo early, will ſcarce come before the latter part of the Month of *June*.

Husbandmen generally uſe to ſow Wheat under furrow in the Autumne; but I have ſeen it with good ſucceſs ſowen in the Spring, and harrowed in after the manner of ſowing Barley; the crop being as good as any other times upon the ſame ground, after the uſual country procedure.

Some ſeeds muſt be ſowen dry, not after raine or watering: Of this kind is Myrrhis ſeed, Baſil, Scorzonera, and all ſuch as being wet run to a Muſcilage.

Many times they ſow divers ſeeds in a Bed together;

ther, as Radiſhes and Carrots, that by ſuch time as the Carrots come up, the Radiſhes may be gone. Upon beds newly ſet with Licorice they ſow Onions or Radiſh, or Lettice if their Licorice plants or ground be but weak, ſo as not quickly to cauſe a ſhadow with their leaves. *London* Gardiners ſow Radiſh, Lettice, Parſley, Carrots, on the ſame bed, gathering each in their ſeaſons, and leaving the Parſnips till the Winter; before which time they are not eſteemed good, or wholſome.

Note, that where your grounds are very warm by reaſon of hedges, hot beds, dunghils, &c. that may abate the power of the froſt, ſeeds may be ventured into the ground much ſooner than otherwiſe in ordinary places.

Cabbage ſeeds and Coleflowers are ſowed in *Auguſt*, or ſo timely as to be exactly well rooted plants before winter; and this is the beſt way: Or are ſowed after, ſo that they are tranſplanted in the time of cold. This way is hazardous in the winter, by reaſon of the nipping Froſts, and chargeable, in that they require much attendance, and covering, and uncovering, which thoſe plants that are confirmed before winter doe not. Secondly, they are more ſubject to Caterpillars in the Summer; but the way of raiſing of them by hot beds in the Spring for Cabbages is the worſt way of all, and moſt ſubject to the peril of that vermine.

Thoſe Plants of the Spring ſowing, that you ſow later than ordinary, require to be the more watered and ſhadowed from the heat.

Thoſe in the Spring that are ſowed earlyer than ordinary, require the more to be defended from the cold.

The

Thoſe in the Autumne, that you prematurely ſow, are to be watered and ſhadowed the more: Thoſe which you ſow late are to be better defended from the Winter till they have gotten ſtrength.

N. 4. *Examples of Sowing with ſome particular directions for ſome choice Vegetables.*

Examp. 1. *From* Mr. Parkinſon; *directing skillfully the ordering of* Tulips *in their propagation by ſeed.*

The firſt example I ſhall give you out of Mr. *Parkinſon*: The time (ſayes he) and manner of Sowing Tulip-ſeed is thus, you may not ſow them in the Spring of the year, if you hope to have any good of them, but in the Autumne, or preſently after they be through ripe and dry; yet if you ſow them not untill the end of *Octob.* they will come forward never the worſe; but rather the better: for it is often ſeen, that over-early ſowing cauſeth them to ſpring out of the ground over-early, ſo that if a ſharp ſpring chance to follow, it may goe near to ſpoile all, or moſt of the ſeed: We uſually ſow the ſame years ſeed, yet if you chance to keep of your own, or have of others, ſuch ſeed as is two years old, they will thrive and doe well enough; Eſpecially if they were ripe and well gathered: you muſt not ſow them too thick, for ſo doing hath loſt many a Peck of ſeed; for if the ſeed lie one upon another, that it hath not roome upon the ſprouting to enter or take root in the earth, it periſheth by and by; Some uſe to tread down the ground where they mean to ſow their ſeed, and having ſowen them thereon, doe cover them over the thickneſs of a mans Thumb, with fine ſifted earth, and they think they doe well, and have good reaſon for it: For conſidering the nature of young Tulip roots is to runne down deeper into the ground, every year more then other; they think to hinder their quick deſcent by the faſtneſs of the ground, that ſo they may increaſe the better. This way may pleaſe ſome, but I doe not uſe it; nor can find the reaſon ſufficient; for they doe not conſider that the ſtifneſs of the earth doth cauſe the roots of the young Tulips to be long before they grow great, in that the ſtiffe ground doth more hinder the well thriving of the Roots then a looſe doth: and although the roots doe runne down deeper in a looſe earth, yet they may eaſily by tranſplanting be holpen and raiſ'd up high enough. I have alſo ſeen ſome Tulips not once removed from their ſowing to their flowering; but if you will not looſe them you muſt take them up while their leaf or ſtalk be freſh and not withered: for if you doe not follow the ſtalk down to the root, be it never ſo deep you will leave them behind you.

The ground alſo muſt be reſpected, for the finer, ſofter and richer the mould is, wherein you ſow the ſeed, the greater ſhall be your increaſe and variety. Sift it therefore from ſtones and rubbiſh, and let it be either fat naturall ground of it ſelf, or being muckt, let it be throughly rotten: ſome I know to mend their ground doe make ſuch a mixture of grounds, that they mar it in the making.

Ferrarius bids that the ſeed be ſowen in *Septemb.* (as ſoon as rain ſhall make the ground fit) half a fingers breadth in good Garden mould, not to be removed in two years after, at which time they are to be removed and placed in ſeverall beds, according to their ſeverall bigneſs, where in 4 or 5 years they will bear heir flowers.

Within a moneth after the ſeed of Anemone's is gather'd and prepared, (in *Auguſt*, ſaies *Ferrarius*, or three dayes before the full Moon in *Septemb.*) it muſt be ſown, for by that means you ſhall gain a year in the growing, over that you ſhould doe if you ſowed it the next ſpring: If there remain any Woolineſs in the ſeed, pull it aſunder as well as you can, and then ſow your ſeed reaſonably thinne upon a plain ſmooth bed of fine earth, or rather in pots or tubs, and after the ſowing ſift or gently ſtrew over them ſome fine good freſh mould, about one fingers thickneſs at the moſt for the firſt time; and about a month after their ſpringing up, ſift, or ſtrew over them in like manner (this is a neceſſary circumſtance) another fingers thickneſs of fine earth, and in the mean time if the weather prove dry, you muſt water them gently and often, and thus doing you ſhall have them ſpring up before winter and grow pretty ſtrong, able to abide the ſharp winter, in their Nonage, in uſing ſome little care to cover them looſly with Fearne, furze, or Bean-ſtraw or any ſuch things, which muſt neither ly cloſe to, nor too farre from them.

The next Spring after the ſowing, or which is better the next *Auguſt* you may remove them, and ſet them in order by Rowes with ſufficient diſtance one from another, where they may abide, until you ſee what manner of flower they will bear.

Many of them being thus ordered, if your mould be fine, looſe and freſh, not ſtony, clayiſh, or from a middin, will bear flowers the ſecond year after the ſowing, and moſt or all of them the third year, if your ground be free from ſmoaks and other annoyances. Nay Mr. *Auſten* of *Wadham Coll.* a skillfull floriſt, aſſured me that he has had Anemones from the ſeed ſowed in ſummer, that were in flower within ten moneths of the time of their ſowing.

N° 3. *Clovergraſſe being eſteemed as great an improvement as any our ground is capable of: I ſhall adde ſuch ſpeciall directions as are given for the ordering thereof:* Sir *Richard Weſtons obſervations and rules are as followeth.*

Clovergraſſe-ſeed thrives beſt when you ſow it in the worſt and barrenneſt ground. Such as our worſt heath ground in England: The ground is thus prepar'd for ſeed.

Firſt pare of the heath; then make the paring into ittle hills: you may put to one hill as much paring as omes off from a Rod or Pole of ground, which is he ſquare of ſixteen feet and a half. The hill being ufficiently made and prepared (as they doe in De-onſhiring as we call it) are to be fired and burnt into ſhes. And unto the aſhes of every hill you muſt put peck of unflake Lime; the Lime is to be covered ver with the aſhes, and ſo to ſtand til Rain comes nd ſlakes the lime. After that mingle your aſhes nd Lime together; and ſo ſpread it over your land. his done; either againſt, or ſhortly after rain, lough and ſowe; ploughing not above foure inches eep and not in furrowes; but as plain as you can, nd to make it yet plainer, harrow afterwards; and hat with buſhes under your Harrowes.

The ground being thus prepared you may ſow your eds. An Acre of ground will take about ten pounds of Clover-graſſe-ſeed, which is in meaſure ſomwhat more then half a Peck. The chief ſeaſon for ſowing it is *April* or the latter end of *March.*

About the fift of *June* it will be ready to be cut: It yeelds excellent hay. The time of cutting it will be more exactly knowne, by obſerving when it begins to knot: for that is the time: And ere the year be done, it will yeild you three of thoſe crops, all of them very good hay; and after you have thus cut it the third time, you may then feed the ground with Cattle all the winter, as you doe other ground.

But if you intend to preſerve ſeed, then muſt you expect but two crops that year, and you muſt cut the firſt according to the foreſaid directions, but the ſecond growth muſt be let ſtand, till the ſeed of it be come to a full and dead ripeneſſe, and then muſt you cut it, and threſh the tops, and ſo preſerve the ſeed, you ſhall have at leaſt five buſhells of ſeed from every Acre.

This ſeed thus threſhed off, there will be lef long ſtalks, theſe your Cattle will eat; but wher they grow old and hard, you are to boile thoſe ſtalk and make a maſh of them, and it will be very nou riſhing either for Hogs, or any thing that eat thereof

After the ſecond cutting for ſeed, you muſt cu that year no more; but as it ſprings again, feed it wit Cattle. One Acre of it will feed you as many Cowe as ſix ordinary Acres, and you will find your milk much richer; which induces ſome not to cut it a all, but onely to graze it for their Dayry.

Being once ſowed, it will laſt five years, and the being plowed, it will yeild three or four years toge ther rich crops of wheat, and after that a crop Oats.

And as the Oats begin to come up, then ſow it vith Clover-ſeed (which is in it ſelf excellent Manure) for you need not beſtow any new dreſſing upon the ground, and by that time you have cut your Oates, you will find a delicate graſſe grown up underneath, upon which if you pleaſe, you may graze vith Cattle or Horſe all that year after, and the next year take your crop as before at pleaſure.

To prevent miſtake, I muſt give this advertiſement, that whereas Sir *Richard Weſton* commends heathy ground, he is not to be underſtood, of uch dry and barren ground without its beſt Manure by chalk, lime, and the like artifices of husbandry. For otherwiſe it has failed in the growth & improvement thereby expected. Mr. *Blith* commends ground naturally good, betwixt ten and twenty ſhillings an Acre: giving this generall Rule, that no land can be too good for Clover that is not too good for Corn.

Hempe and Flax are vſed to have the ſame culture, nd the beſt husbandry that I have obſerved of them as been in *Staffordſhire*, where this procedure is enerally obſerved. About the beginning or middle f *Aprill* the flax ſeed is ſowen upon new broken round, immediately upon its being broken up. The eed they either have from their own Crop, or buy it rom a warmer Country: Mr. *Blith* reports the true aſt-Country ſeed to be farre the beſt, who for tryall f both, ſowed on the ſame land, the Ridge or Middle with our Country ſeed, and both the furrowes, ith Dutch or eaſt-country ſeed, (ſuch as is bought the ſeedſmens ſhops at *Billingſgate* in *London*) the fect was that our ſeed, though on the ridge it had the dvantage of the ground, was encompaſſed with the utch, as with a wall about it, ſo much the Eaſterne ſeed did out grow it. He likewiſe for warmer parts, as Eſſex and Kent thinks *mid-March* a convenient ſeaſon for ſowing it: If weeds grow therein they carefully weed their crop and pull it in dry weather when it lookes yellow, leſt growing over ripe it blacken and mildew, and tye it up in handfulls that it may perfectly dry. Then they ripple it, is, that they get out the ſeeds by drawing it through an Engine like an iron double tooth combe, which they call a Ripple: the boles of ſeed pulled off, they lay on a boarded or playſterd floore to dry, it being dryed they lay it up and threſh it not out of the boles till *March*, when they winnow it clean from the huskes.

The watering of it is thus: The Flax being well dryed, they bind up about 20 handfulls in a bundle and putting many of theſe bundles together they ſtake them down in the water, that they may not be carryed away by the Streame. The flax abides in water 4 or 5 dayes and nights, then they ſpread it on the graſſe that it may dry, turning it every 3 dayes, and when it is full dryed they lay it up and houſe it, and when they ſee their occaſion they uſe their Brake and Crack, inſtruments deviſed for the purpoſe to bring the Tow from the Flax; The whole Government and huſbandry of hemp from the ſeed to the diſtaffe is ſo lik this of Flax that the ſame example and rule may ver well ſerve for both.

Woad, according to Mr. *Bliths* directions, is beſt ſowed where you ſow your Barly or Oates, upon that ver huſbandry or tilth, about the middle of *March*, an may grow up among the Corn becauſe it groweth no faſt the firſt ſummer, but after the Corn is cut must be preſerved; it requires a rich and warme ſoi

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This plant is of great uſe to Dyars,and coloureth the bright yellow or lemon colour, It abates the ſtrength and ſuperrichneſſe of land, and may prepare for Corn in kind of its own Nature too rich, which is, as Mr. *Blith* obſerves, ſometimes a fault, though not ſo frequently as the contrary extreme.

Beans require a low deep ground and Wateriſh,not dry, ſandy or gravelly ſoyle: This is true of feild beanes, though I firſt tooke notice of the great difference in our London Gardens,where the labourers for their own eating would give one part in three more for a meaſure of beanes from the former than from the latter ſoyl,who aſſured me that from the ſame ſeed and care garden beans have much more meale, pulpe, or kernell and thinner skins in the moiſt than in the dryer and leſſe wateriſh ground.

N. 4. *The Generall obſervations for the manner of ſowing.*

Beſides the Examples aforeſaid, I ſhall adde ſome rules ſuch as by Gardiners are uſually obſerved.

This is generall that all ſeeds muſt be covered with the earth; which is done, either by ſowing the ground and turning the ſeed in under the furrow, or by drawing trenches in the ſoyle, and then drawing the earth over them with a hoe, or ſowing the beds ready dreſt, and hacking in the ſeed with the ſame inſtrument, or by harrowing, raking with a rake or drawing buſhes over the ſowed ground to cover the ſeed, or to ſet the ſingle ſeeds with a ſtick, or laſtly to ſow the ground and afterwards to ſift or ſtrow fine mould thereon.

The two laſte wayes are for choice ſeeds when the workeman deſires to looſe none for want of burying the ſowing under furrow is for ſuch ſeeds as muſt endure the winter, the depth of ground being part of their ſecurity againſt the winter colds: nor are all ſeeds of ſtrength to ſhoot their germen through ſo much earth. The ſowing in trenches is uſed for Peaſe, there being thereby ſpaces left between the rowes, of half a yard more or leſſe, to gather them as they ripen, and roome whence to draw mould to the roots, which frequently done, is very advantageous to them. It is likewiſe handſome for Spinach, Endive, Thyme, Savory or other garden herbs to grow in rowes after this manner of ſowing.

Moiſture is abſolutely neceſſary for the growth of all plants, two or three dayes after a great rain is accounted a good ſeaſon; in dry weather two dayes after rain ſay the London Gardiners, agreably to that of *Ferrarius*, *Nec tamen ſimulac magnis imbribus terra permaduit ſeres, ſed tantiſper expectabis, dum pluvius ille mador modice exſiccetur, ne madenti limoſoq; in ſolo ſtatutæ radices exputreſcant* de Fl. cult. l. 3. c. 1. Seeds that are apt to run to a Muſcilage are unfit to endure moiſture upon that account, as elſ-where I noted.

I preſcribe nothing concerning the obſervation of the faces of the moone, becauſe I much doubt of any effect therefrom. Neither doe Gardiners that work, nor Authors that write, preſcribe alike rules; but contradict each other in their direction, for the particular obſervation of this Planet, as to any intended production. Nor is it agreeable to my reaſon, that the moones being in the full at the firſt explication of the two diſſimilar leaves, or germination of the plant, ſhould cauſe a double flower, this germination according to this preſent Hiſtory, differing little from other augmentations of the ſame plant, in oppoſite

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quarters immediately enſuing: ſo that if a full moone be proper, I ſee no reaſon why it may not be effectuall, by vertue of the ſame phaſis the third, as the firſt or the twelveth, as the ſixt day of the ſeedlings augmentation.

The meliorating of ground belongs to the head of Improvement; here I ſhall only obſerve that where ground is very light, as in ſome London and Kentiſh gardens, it is found profitable after ſowing to tread in the ſeed.

Some ſteep all garden ſeed before they ſow them to make the germination the more ſpeedy, but ſeeing there be no better wayes of infuſion than in Earth and Water, why the ſame boſome of a well watered ground ſhould not be moſt fit for this operation I ſee not.

In ſeeds that are long in coming up, the ſeed bed is not to be digged up the firſt winter: For I know diverſe ſeeds that will for a great part of them ly under ground the firſt, year and come up the ſecond: of this Nature is the Aſh-key ſometimes, the Peach, Malecotone and ſome Plums.

N. 5. *Of variety of kindes, different in colour, taſte, ſmell, and other ſenſible qualities, proceeding from ſome ſeeds; and what plonts they are that bring ſeeds yeild-ſuch variety.*

In Carnations you have ſeeds that give admirable Variety from the Orange-tawny Carnation and all his ſtrip't kinds that are double and keepe their tawny in them in any meaſure. The white, Tawny and Carnations darkly ſpotted, *Ferrarius* commends for producing variety of colours and ſtripes. Kernells of divers Apples and Peares bring variety of kinds, different in taſte, ſmell, colour, and hardneſſe, and are as often promoted to better; as the degenerate to worſt, as I am very credibly iuformed, by perſons that profeſſe themſelves to have ſeen the experience. The kernells of the Burgundy Pear has brought a noble alteration and produceth a pear farre beyond that excellent kind: Peaches and Malecotones doe ordinarily the like, ſo that by ſeed is thought to be their beſt propagation.

Our Gardiners in chooſing the ſeed of ſtock-*Gylli*flowers to make them bring double ſtocks, take their ſeed from ſuch tops as bring fine leaves in their flower, eſpecially if it be one ſtrip'd; but Mr. *P.* ſayes thoſe that bear double ſeeds, cannot be diſtinguiſhed from the other, and I have reaſon to beleive him, for ſuch as chuſe their ſeed this way, doe not find that it anſwers their expectation.

For Tulips that are early, or Præcoces, the purple ſays Mr. *Parkinſon*, I have found to be the beſt; next thereto is the purple with white edges, and ſo likewiſe the red, with yellow edges; but each of them will bring moſt of their own Colours. For the Media's, take thoſe colours that are light, rather white then yellow, and purple, then red; yea white, not yellow, purple, not red: but theſe again to be ſpotted is the beſt, and the more the better; but withall or aboveall, in theſe reſpect the bottome of the flower (which in the precox Tulipa you cannot, becauſe you ſhall find no other ground in them but yellow) for if the flower be white or whitiſh, ſpotted, or edged and ſtraked, and the bottome blew or purple (which is found in the Holias, and in the Cloath of Silver, this is beyond all other the moſt excellent, and out of queſtion the choiſeſt of an hundred, to beget the greateſt and moſt pleaſant variety, and raritie; and ſo in degree the meaner in beauty you ſow, the leſſer ſhall your pleaſure in varieties be: Beſtow not your time in ſowing red or yellow Tulipa-ſeed, or the diverſe mixtures of them, they will (as I have found by experience) ſeldome be worth your paines. The Serolina being not beautifull, brings forth no ſpeciall varietye: *Ferrarius* lib. 3, chap. 7. commends the Serolina for ſeed, (but I find he makes but two ſorts; Præcoces and Serolin's) and among them the white, with the black purple, or blew bottomes or Scarlet with skycoloured bottome inclining to purple; for both them will (ſayes he) bring Tulips mark't with varietye and handſomneſſe: But Tulips without a blackiſh bottome are noe good breeders of various coloured flowers.

The two leſſer Spaniſh baſtard Daffodills, the leaves of which are of a whitiſh green colour, one alittle broader then the other, and the flowers pure white, bending down their their heads, that they almoſt touch the Stalk again, give Seed from which ſprings much varietye, few or none keeping either colour or height with their mother plant.

The ſeeds of divers Sowbreads, by name the Roman Sowbred with round leaves, the Autumnall Ivy leaved Sowbread, ſome flowers-de-lis, and many ſorts of Bears-eares doe the like in produceing admirable variety.

As for Anemones, take't from Mr. *P.* and our common dayly experience that there is not ſo great variety of double flowers raiſed from the ſeeds of thinne leave'd Anemones as from the broad leaved ones. Of the Latifolias, the double Orange-tawny ſeed being ſowen, yeildeth pretty varietyes, but the purples, or reds, or crimſons, yeild ſmall varietyes, but ſuch as draw neareſt to their originall, although ſome be a little deeper or lighter then others: But the light colours are they that are chief for choice, as white, aſh-colour, bluſh or Carnation, light Orange, Simple, or party-coloured, ſingle (or double if they bear ſeed) which muſt be carefully gathered, and that not before it be fully ripe; which you ſhall know by the head, for when the ſeed with the woollineſſe beginneth a little to riſe of it ſelf at the lower end, then muſt it be quickly gathered, leſt the wind carry it all away, after it is thus carefully gather'd it muſt be layd to dry for a week or more; which then being gently rubbed with a little dry ſand, or earth will cauſe the ſeed to be better ſeparated, although not throughly, from the woolineſs or downe that compaſſeth it.

In the ſeed of the Mervayle-of-the-world, take notice, that if you would have variable flowers, you muſt chuſe out ſuch flowers as be variable while they blow; that you may have their ſeed! for in this plant if the flower be of a ſingle colour, the ſeed will likely bring the ſame.

N. 6. *Some other relations of tranſmutation, and the poſſibility of a change of ones ſpecies into another examined.*

I have often heard perſons affirme, that they have ſowed Barley, or ſome other grain, and in the ground the ſeed has been ſo altered as to ſend forth Oates inſteed of corn, according to its own ſpecies. I am as yet farre from giving any aſſent to this their Hiſtory. The Reaſons why I diſbeleive them are, firſt, becauſe the Relators affirme whole fields to be thus varied, and that to one ſpecies (viz) of Oates, which is different from Barley in the ſtraw, eare and grain it ſelfe. Whereas in the variation of ſeed , in thoſe vegetables,in which the change is undoubted, the colour only or ſome other eaſily alterable accidents,ſuch as the ſenſible qualities are generally found are tranſmuted , and this tranſmutation ends not at all in another divers kind ; but in ſeverall ſmall diverſities of the ſame kind ; The ſtoryes of Wheat turned to Muſtard-ſeed were as likely to be true , and is a fit parallell to create a right beleife of the true cauſe of the mentioned effect. Secondly, I knew a Gentleman who plowed a piece of land in the ſpring , and then ſowed it not, but after it was harrowed and prepared for ſeed left it to its own Genius and nature to produce what it was inclined to : The Ground was off its own Nature apt to bring forth wild-Oates amidſt the Corn , now in defect of Corn there grew as many wild-Oates unmixt from any other weeds, as the land could carry. This was tryed in a great peice of land, and much proffit was made of the Oates, the Gentleman having cut them green for Fodder *Anno* 1657.

My judgment therefore is, That the fallacy which befell my above named Relators was, that they miſtook the cauſe of the production of the Oates mentioned; for to me it is much more eaſie to conceive, that by ſome evill accident, as it often happens (the ſeedcorn being corrupted and periſh't in the ground) the ground it's ſelf from its own Seminary , ſent out the ſuppoſititious Crop of Oates or Muſtard,than that there ſhould be a variety of ſo ſtrange a Nature, and declenſion from its property ,in the iſſue of any ſpecies.

It is indeed growen to be a great queſtion,whether the tranſmutation of a ſpecies be poſſible either in the vegetable, Animal, or Minerall kingdome. For the poſſibility of it in the vegetable: I have heard Mr. *Bobart* and his *Son* often report it, and proffer to make oath that the Crocus and Gladiolus, as likwiſe the Leucoium, and Hyacinths by a long ſtanding without replanting have in his garden changed from one kind to the other: and for ſatisfaction about the curioſity in the preſence of Mr. *Boyle* I tooke up ſome bulbs of the very numericall roots whereof the relation was made, though the alteration was perfected before, where we ſaw the diverſe bulbs growing as it were on the ſame ſtoole, cloſe together, but no bulb half of the one kind, and the other half of the other: But the change-time being paſt it was reaſon we ſhould beleive the report of good artiſts in matters of their own faculty.

Mr. *Wrench* a skilfull, and induſtrious gardiner for fruit and kitching-plants told me that the laſt year there was a change betwixt the kinds of the Coleflower, and the cabbage. Others I know who as from their experience moſt confidently affirme that they have prime-roſes of the milk white colour, the root whereof before in another ground bare Oxelips: and it is uſually beleived that divers ſingle flowers may be changed into double by frequent tranſplantations, made into better grounds. I knew thoſe that have had the wood Anemonies, and Colchiums double, who affirme that they took them into their garden wild, and ſingle, and that that change was made by the ſoyle, and culture of the place.

For the animall Kingdome the inſtances of tranſmutation are in ſilkwormes, cadiz, and all caterpillars, which after a long ſleep from the reptile turne into the volatile kind.

The minerall Kingdom is ſuppoſed to be famous and fruitfull in theſe changes, the hope of the Philoſophers ſtone,or perfecting medicine requiring this beleife: Yet I am perſwaded that in many of their changes they rather ſeparate, and bring to apparence a latent minerall,than produce it by the tranſmutation of another into that nature. *Sennertus* recants thoſe writtings of his,that affirmed iron to have been turned into copper by naturall,and artificiall waters of Vitrioll. The effect only in his ſecond, and more mature judgment being the ſeparation of a copper before latent in the Vitrioll, and the precipitation of it by the parts of the iron: and I have ſeen ſome experiments made by the honorable Perſon,for whom I am now writing, that have added ſtrength to my former perſwaſion, particularly the ſuppoſed tranſmutation of quickſilver into lead,publiſhed as real by the learned *Vntzerus* and others, and to be made by diſſolving the quickſilver in aqua fortis, & precipitating it by the tincture of Minium,proved but ſophiſticall, the Lead produced that way being indeed not made of the Mercury,but only reduced out of the tincture of *Minium*, wherein it lurck't, as that Gentleman doth more circumſtantially ſet down in his own papers, and others of the like nature, which it were not proper here further to inſiſt on.

It is a queſtion, whether there be any reall tranſmutation, from the vegetable to the minerall kingdome, in petrifaction of any ſort of wood: thoſe petrifactions, which I have ſeen in England, are made thus, ſome particles of ſtone, that impregnate the body of water, make a cruſt about the ſtick that is to be petrified, and enter into the pores thereof, as faſt as they are layed open by the water, waſhing through the ſtick. wherein there interceeds, noe change of the ſame parts, but by addition of ſome , and ſubſtraction of others , if I imagine aright , the new effect is wrought. The proof whereof may be , that the fibres of wood appear viſible and to the touch and taſte amidſt the body of the ſtone.

In Ireland there is a Lake wherein (as that Noble Perſon I but now mentioned, hath related to me) there is ſoe great a petrifying faculty that the beſt whetſtones uſed in that nation , are made of wood , caſt therein to be petrified . In which ſtones though all the lineaments of the woody fibres remain, yet they are indued with the hardneſſe, and other qualities of an exact ſtone. And Corall , the entire ſtonyneſſe thereof noe man can doubt , may well be imagined to be originally a vegetable bearing root , ſtalk, and leafe ; and that afterward it is turned into its hardneſſe by the peculiar property of the water: whether theſe operations of nature are likewiſe perfected by addition and ſubſtraction of parts only,or whether it be required that ſome parts for the production of this effect be tranſmuted I ſhall not determine.

And for the deciding the whole queſtion ,if the form be ſpecificall,and ſo made by the aggregation of a certain number of accidents,thoſe accidents & that number muſt be aſſigned that are thought enough to compleat a new form,before we may begin to judge in this matter for that very many accidents maybe changed it appears bythe above named inſtances in vegetables & in other bodyes many more : Vinegerand Wine,are the ſame parts tranſpoſed and yet there ſeemes to be more difference between them than between Endive and Cichory ,Maidenhaire and Scolopendrium , Rubarb and Dockes , which are in Vegetables eſteemed for diverſe ſpecies formally or ſpecifically diſtinguiſhed.

N. 7. Of Proviſion for ſeed.

Many Rootes are to be tranſplanted at the latter end of the year, and will bring forth perfect ſeeds: as, Carrets, Parſneps, Turneps. Cabbages are to be layd in Cellars all winter, the roote and Cabbage being replanted in the ſpring, or the ſeed may be got, though not in ſo plentifull a manner, from the ſtalks of Cabbages, whence in the ſeaſon the Cabbage was taken either replanted, or ſtanding in their old places: Coleflowers give their ſeed from the like care that is beſtowed on the Cabbage.

I have ſeen Gardiners that provide Cabbage-ſeed in great quantitie for the ſhops in London upon their courſe ground, to ſow Cabbage ſeed which without tranſplantation ſhall bring forth Coleworts for boyling hearbs, and then a crop of ſeed: many plants that bear fruit bring their ſeed every year in their fruits, ſo Apples, Peares, Plumes, Peaches, Aprecots, Wheat, Barley, Rye, Peaſe, Beanes, and many that beare no fruit doe the like, ſo Lettute, Radiſh all graſſes, ſo that unleſſe ſome peculiar plants which require to be excepted: Yucca Indica, bears neither flower nor ſeed in leſſe than four years time: 'tis generall that each ſeed will ripen every year, and the beſt generall token of maturity is its looſneſs from the pedall by which its joyned to the ſtock, ſo as kernells in ripe Apples grow looſe from the core.

Thoſe perſons that make Verjuce or Cider can beſt furniſh him that intends a Nurſery; for notwithſtanding both the violence of Mill or Preſſe, the kernells ſcape entire enough for Vegetation; but care muſt be had that they be immediately ſowen after the preſſing.

leſt being layd on a heap they heat, in the manner of wet Hay, and burn the germen of the ſeed, which in the moiſture of the bruiſed fruit by that heat will prematurely ſprout forth to its own periſhing.

In providing Lettuce ſeed, mark the plants that you ſee ſtrongeſt for ſeed, and after they have begun to ſhoot ſtalks, ſtrip away the loweſt leaves, for two or three hands breadth above the ground, that by them the ſtalk be not rotted.

Let Carnation and Gillyflower-Cods of ſeed ſtand upon the Roote ſo long as you may, for danger of froſt, then cut the ſtems off with the Cods on them and dry them ſo, as not to looſe the ſeeds; The dryneſſe of the Cods and blackneſs of the ſeed is an Argument of ripeneſſe: *Ferrarius* Lib: 3. Cap. 15. Reports, that the bottome of every Cod brings the beſt ſeed: and the largeſt flowers.

The ſeed of Crocus's are only, or at leaſt, beſt taken from the ordinary ſtript vernall Crocus, the great purple Crocus, the great blew Crocus of Naples, the ſtript purple, the leſſe purple, flame coloured, the purple with ſmall leaves, the yellow ſtript, the cloath of Gold. Clovergraſſe and ſeeds of that nature, are provided by letting the graſſe run timely to ſeed; particularly by moving it about *May* and thence abſtaining till the ſeed is through ripe.

Such ſeeds as are weighty and ſinke in water are beſt; the contrary are uſually languid and unfit for propagation.

Out-Landiſh ſeeds are uſed for ſuch plants, whoſe ſeeds cannot be got here for want of Maturity, or any other reaſon.

The Spaniſh-Muske-Melon-ſeed is accounted beſt, though we uſe our own with good ſucceſſe: few Gardiners here will uſe their own Onion-ſeed, for they find it runnes to Scallions : Myrtle with us comes not to ſeed , nor Mulbery. For the ſenſitive plant , the Amaracoc or Paſſion flower &c. we ſend for ſeed to the Barbado's.

What advantage our Nation might have by propagation of exotique plants by ſeed brought new from everall Countryes beyond the Seas, tis hard to gheſſe hat there would be advantage tis certain. I remember that *Bellonius* a man very diligent, and much employed about knowing the nature of plants , growing n other Countrys than his own , which was France, vrote a whole book to ſhew the poſſibility and advantage of this improvement , to perſwade Merchants to urniſh gentlemen with ſeed , and them to uſe it. Tis nown that Peaches , Aprecots , Nectarins were tely not only ſtrangers to England , but to France kewiſe. Mulbery is likewiſe an Exotique plant, and y King James his Command ſent for over and propagated by ſeed.

xotique Seeds are good not only to propagate lants yet not with us , but likewiſe to make a more lentifull production then can with eaſe be made from ny other way of propagation of ſuch we already ave.

Care muſt be had in ſowing ſeed, or at leaſt in ſetng them, where you intend that they ſhall thrive, at the ground bear the beſt proportion may be to e places and the particular Minera of the places here ſuch plants in other parts uſe to grow, not to it mountainous plants in low and moiſt grounds. hy the Taurick Cedars, were they planted in Walles, ould not grow I know no reaſon.

It were worth the while to conſider in all ſeeds, whether there be not diſtinguiſhable difference in the ſeed, that may be of uſe, as to ſooner, or greater growth. In the ſame bed divers ſeeds being ſowed of one kind, particularly Apples, Peares, Plummes, Cherrys, or Peaches, ſome Apple ſeedlings will in the ſame mould, and diſtances, much outſhoot the reſt of the ſame kind, and ſo in the Pears, and other kernels: it might here be enquired, whether the great or leſſe, ſend bigger plants, and of ſpeedier growth? as it is by ſome obſerved in buds, that the fairer the bud is upon the ſheild and ſtronger, the better thrives the inoculation, and not only growes more certainly but more luſtily.

2. Whether the Canker in pippins, ariſe not from an incongruous grafting, and it were not better to bring them up from kernells, or graft them on a more mild ſtock than that of a Crab.

Whether there might not be gotten diverſe year ſooner trees of ſtature from kernells of great bodye and quick growing Apple trees, and ſuch whoſe kernells vary not much their kindes, than from Crabbs which is a wood of a ſlow growth and harſh Nature.

N. 8. *The manner of growing by ſeed.*

The ſeed is conſidered either as allready made, as it is under the hands of Nature, imperfect, yet i the way to be made.

In it made, there are conſiderable, firſt, the Coat and cotton that cover it about, and preſerve it fro injuries; ſecondly, the eſſentiall and proper parts the ſeed it ſelf.

Many ſeeds have two Coates above the Cotto nd one thinne one under, next inveſting the ſeed, uch are Sicamores.

All ſeeds that I know have within their Covers acually a Neb, which anſwers to a roote, which is oyned to leaves more or leſſe in number: betwixt he ſtalks of, or amidſt theſe leaves there is a bud, eye or Germen, juſt oppoſite to the Neb, or initiall Roote, but by reaſon of its ſmallneſſe it is ſcarce diſcernable in many ſeeds till it begins to ſpring.

1. Moſt plants have only two leaves actually joyned to the Neb, which are commonly very unlike the proper leaves of the plant: of this ſort are the flowers of the Sunne, Ediſſarum Clypeatum, Cucumbers, Melons, Amaranthus, Thiſtles, Thlaſpyes, Mallows of divers kinds, Arch-angells Spurges, Nettles, Clay, Orach, Dill, Parſely hath two leaves diſſimilar, but not much ſoe, Melilot two diſſimilar, and one, if I miſtake not, ſimilar.

2. Many plants have more Leaves in the ariſing rom the Neb, as Creſſes have ſix.

3. Some plants have but one diſſimilar leafe as Anemones, Tulips, Fritellaryes and all bulbous ſpring flowers that I have obſerved. Wheat, Barley, Rye, ll grain and graſſes that I know have a germen wrapped up att one end of the grain in a hoſe or ſheath which germen conſiſts of leaves wrapped about the bud by a plica, or folding made the long way of the leafe, not overthwart as in Sicamores, Maples and oher complicated leaves of ſeeds. Nor doth the whole corn divide it ſelfe into leaves, and coates or huske as in thoſe examples, but the greater part hereof containes a meale which by the heat and moiſture of the ſoyl is turned into a pappy ſubſtance not unlike the Chyle found in the lacteals of animal

bodyes,

37 bodyes, and may be as I ſuppoſe, repoſed nouriſhment for the young blade at ſuch time as the earth would prove but a dry Nurſe. I have taken notice that Carnations come up ſometimes with three, ſometimes with four leaves, though the moſt have but two: and it is Mr. *Bobarts* obſervation, that ſuch as come up with more leaves than two, prove double flowers, which if it generally holds true, it were a compendious way to weed out all the reſt at the firſt coming up, to avoid the labour of culture of ſuch plants as in the end will not prove advantageous for profit or pleaſure.

Beanes, Peaſe, Kidney-beanes, Lupines, have this peculiarity, that the grain being cleft, each half is as one of theſe diſſimular leaves, which is uſually contained in every ſeed; and between theſe thick leaves are contayned other ſimilar leaves, or ſuch as differ but in growth or bigneſſe from the true leaves of the Plant. 'Tis to be obſerved in all theſe great ſeeds, that though the pulſe, or thick part of the grain periſh, yet if the Neb and ſmal leaves are entire, the ſeed may proſper; as I have ſeen Feild-beanes that have been eaten through with wormes, prove good thriveing ſeed. But tis reported, that Piſmires have learned the wit to ſpoyl the ſeed from growing in their ſtore-houſes, by biting off the very Neb before they repoſe the grain.

The growth of the plant from the ſeed is thus; by convenient moyſture and heat, the Neb ſtricks through the Covers, and goes directly down, if not impeded, in earth or water, a convenient way, ordinarily, two or three inches, in which time the leaves either rowled up, or otherwiſe incloſed, break their bonds, and explicate themſelves, being lifted commonly a little higher by the growth of the ſtalk, or lengthned

Neb: and you may obſerve, that the growth above ground, at the firſt motion upward, is nothing proportionable to the motion downward. After the root is well made and faſtned betwixt the leaves that were actually contained in the ſeed, there ariſes into more plain ſight and appearance, that litle Germen before, in many plants ſcarce ſeen, like to that bud, which is left on plants in winter, which ſpringing, brings forth the true leaves and Branche, of the plant ſowen.

If I am enquired of, whether each ſeed has a compleat eſſence and diſtinct form of its own. Nay further, whether it be a true and perfect plant? I muſt ſay that I have found it ſo to be, even more than an egge, a liveing thing, and immediately nouriſhable It has root to grow, body to bear the port of the plant, Bark to direct the Sap into all its parts, and germen or bud to ſecure the meanes of future growth, and to boote leaves, which is all and ſomewhat more than in the winter the ſturdieſt Oke can boaſt of.

It has been accounted an Intereſt in Philoſohpy hererofore, and that in our Schooles, that ſeed ſhould not be eſteemed an actual and formal plant, becauſe of divers abſurdities, that if ſeed were animall, would happen in their Schoole doctrine; as that there would be pluralities of formes in the ſame trees; The Soule might be diviſible into parts; The ſame thing might be agent and patient; Nay ſome have ſaid, that it may be of dangerous conſequence in Divinity, if it were granted, that ſeeds had the actuall formes and eſſence of that thing whoſe Seeds they were.

I am glad tis noe Hereſy now, to appeale to ſenſe from a Doctors opinion, and that I may freely in this matter require to be tryed by my garden, though it be againſt the ſentence and Judgment of the Doctors

Conimbra , *Suarez* , *Ruvio* , *Pererius* , *Bonamicus* ; *Fonſeca* ; and that we begin to lay aſide the fear, that from a certain truth , ill conſequences may ariſe: That Canon will certainly hold longeſt which is beſt built in the bottome.

It is conceived by ſome that the immediate cauſe of the Growth of the ſeed , is the Spirit working upon the Salt and Sulphur , Earth and other conſtituent parts or Elements of the Seed : For the Spirit is ſuppoſed to be made Volatile by the heat of the earth and water , which in Spring and Autumne , (the cheife times of germination) is of a proper temperature for fermentation; and then the ſpirit being ſo Volatized, and riſeing up and expanding it ſelf every way augments the whole plant , and diſtends the ſides of the ſeed , whereby the growth of the ſeed plant is effected.

But how it comes to paſſe, that the conveiance of theſe expanded particles is ordered to proceed, according to the lineaments of each Vegetable, noe perſon to my knowledge has yet made any conceit ; and it being beyond any ocular diſcovery of the moſt acute Searchers , to finde out the Conduits or Trunckes ſerving to ſo intricate a carriage , and how it comes to paſſe , that a ſeed firſt , has its Neb thruſt downe without dilatation of the ſides , and then , how the upper part of the Neb or germen orderly frames the Vegetable above ground in ſo trim a body , rather then a confuſed maſſe, I take it not for any part of my taske to enquire.

I ſhall likewiſe leave it to the imaginations of Philoſophers to determine, whether upon the diſtention made, it be by an elective faculty in the Seedling, filled up with ſimilar parts drawn from the Earth, and ſo by Nature originally fitted ſpecifically for that plant: or whether there being a continual motion of particles from the earth, preſſing upon the plant, thoſe only get entrance whoſe ſhapes and figures are ſuch, as correſpond to the pores in the young Vegetable; which meeting in the body of the plant with its conſtituent parts in nature not unlike themſelves, they eaſily are joyned thereto, and ſo cauſe an augmentation in the whole: or whether diſſimilar parts, either to fill up the Vacuum made by diſtention, or for other reaſons, got up into the plant, doe obtain there a change of nature, and from the form, Soul, Archeus, or other principle, are altered from their firſt being, into a likeneſſe of nature with the Seedling, and become homogeneous to it; Theſe are Queſtions, in the determination of which, till I am better informed, I deſire to take no ſide.

N. 9. *Of the cauſe of Greenneſs in the leaves of Vegetables.*

It has been made a queſtion by ſome what it is that cauſes greenneſſe in all Herbes, eſpecially ſuch whoſe ſeed, and the ſtalk, and Leafe, contained therein are white, and whether the cold beating of aire and water upon Vegetables may not have ſome influence in the production of this effect.

I truely have been tempted to think the affirmative, which is that the coldneſſe and briskneſſe of the free aire, in plants that grow in the land, and the like qualitie of the water, in water plants produces the verdure or greenneſſe, that is generally the beauteous Veſtment of all Vegetables, or at the leaſt has ſome conſiderable influence as to this production: for by experience I have proved that plants being in a cloſe roome, brought up from ſeeds in pots, or otherwiſe, the leaves and ſtalks prove to be white, or pale, & not green, which is according to the Lord *Bacons* experiment, who *Cent.* 5. *Exp.* 47. ſetting a Standard Damask-Roſe-Tree &c, in an earthen pan of water, where bearing leaves in the winter, in a chamber where no fire was, the leaves were found (as his Lordſhip relates) more pale and light coloured, then leaves uſe to be abroad; which paleneſſe, I ſuppoſe to be greater or leſſe, proportionably to the freſhneſſe and freeneſſe of the aire that the plant enjoyes. Graſſe will likewiſe change its colour, if by any weighty body, or other lying upon it in the field, it be kept from the aire: The truth is, all plants have peculiar delight in the aire, which I have proved by this Experiment; I have taken young ſeedlings in a pot, and put them in a window where there was a quarry out, the ſeedling would immediately leave its upright growth, and direct its body ſtraight to the hole, and ſo become almoſt flat and levell with the earth in the pot: Then turning the pot ſo, that the inclination of the ſtalk might be from the hole, the plant has then crook't it ſelf in form of a horn, or the letter C. to the aire again. Upon the Second turn of the pot, the upper horn being placed from the aire, the plant would, with its upper part, return to the open place, and leave the ſtalk now in the form of an S. Nay, ſometimes I have bid perſons tell me, which way they would have ſuch a plant grow; they have marked the place in the brime of the Pot, that mark I have turned to the hole in the window, by which means the plant without any force, and that in not many houres ſpace, hath inclined its ſtalkes to the mark made.

That the aire has great influence in producing the verdure of plants, may likewiſe not improbably be argued from the Experiments of Blanching, or whiting the leaves of Artichockes, Endive, Mirrhis, Cichory, Alexanders, and other plants; which is done by warm keeping of them, without the approach or ſentiment of the Coole and freſh aire; whereby all plants that otherwiſe would bear a green colour, become exactly white.

Hence it may likewiſe bee, that the roots of moſt Vegetables that are under ground, and covered from the aire, are white generally, whereas the ſtem, and upper parts of them are ordinarily green, and many rootes that are by nature of a peculiar colour, as Radiſhes, yet the point of the roote that is deepeſt in the ground, retaines a whiteneſſe, as well as other roots, being in that part of the roote removed from the aire, the red part commonly ſtanding above or juſt in the ſurface of the earth.

Hence alſo it may be, that thoſe leaves of Cabbages & Lettuce that are expanded in the free aire are green, thoſe that being covered with their fellowes: and ſecluded from the blaſts of wind and weather, and kept in a warme Covert, become as white as any thing that is artificially blanch't.

True it is that, there be plants that grow in the bottome of waters, and ſo cannot be ſuppoſed to have this help from the aire, otherwiſe than as the aire chills the water, and the water having received this qualitie from the aire, makes the like impreſſion upon its domeſtique plants.

Chap. 2.

Of Propagation by offsets.

N. 1. A Catalogue of Plants which may be propagated by offsets and ſuckers ariſing with Roots from the ſtool and Roote of the Mother Plant.

Aconite or Wolfes-bane.
Adders-tongue.
Alexanders.
Anemones.
Angelica.
Ariſtolochias.
Artichockes.
Aſphodels.
Aſarum.
Aſparagus.
Avens.
Barberies.
Barrenworth.
Bawme.
Bears-eares.
water and wood *Betony.*
Biſtort.
Spaniſh *Broome.*
Butchers Broome.
Brooklime.
Briony.
Burts, and ſuch like Apples.
Bugloſſe.
Burdocke.
Burnet.
Calamus aromaticus, which requires moiſture.
Camomill.
Caltha or *MarchMarigold.*
Cherryes where the ſtock is not grafted.
Chives.
Cinquefoyle.
Clownes all-heal.
Coſtmary.
Cowſlips.
Comfrey.
Cowſlips of Jeruſalem.
Coltsfoote.
Columbines.
The *Crown* imperiall.
Crowfoot.
Cuckowpints.
Dames violet.

Dayſyes.
Dens Leonis bulboſus.
Dittander.
Dockstooth.
Dockes.
Dorias his wound wort.
Dragons.
Dulcamara, or woody night-ſhade.
Egrimony.
Elmes.
Elicampane.
Everlaſting *Vetch.*
Ewe.
Fernes.
Feverfew.
Figtrees.
Filbeards.
Filipendula.
Flowers-de-Luce.
Fleuellen or *Speedwell.*
Galingall.
Garliques
Gentianella.
Germander.
Gooſberryes.
Golden-rod.
Ground Ivy.
Haſelnuts.
Harts tongue.
Herba paris.
Helleborine.
Hellebores.
Hercules all heal.
Hyacinths.
Horſradiſh.
Houſeleeke.
Horſemints.
Hops.
Horſetaile.
Jaſmine.
Jeruſalem Artichoke.
Kentiſh Codlings.
Knapweed.
Lovage.
Lady's bed ſtraw.
Lilyes.
Lilium convallium.
Lunaria.
Lungwoort.
Mandrakes, for often there may be takē from them particles of their roots, which will grow well; though the uſuall way of their propagation is by ſeed.
Marſhmallowes.
Maſterwort.
Madder.
Mints.
Moly.
Monkshood.
Mulberryes.
Mugwort.
Nurſe-gardens.
All ſorts of *Orchis*, or *Docks-ſtone.*
Petaſitis.

Periwincle.
Peony.
Peaſe.
Pilewort.
Poplars.
Potatoes.
Prunella.
Primroſes.
Pulſatillas.
Raſpes.
Radix cava.
Reeds.
Roſes of moſt kindes.
Ruſcus or Butchers broome.
Rubarbs.
Satyrions.
Saponoria.
Sanicle.
Scabious.
Sedum.
Serpillum.
Setfoyle.
Skirrets though ſeeds will produce better.
Smallage.
Sorrells.
Solidago Saracenica.
Solomons Seal.
Some *Spurges.*
Stitchwort.
Strawberryes.
Sword flags.
Tarragon.
Tanſey.
Thiſtles.
All ſorts of *Tulips.*
Valerians.
Some *Vetches.*
Vervaine.
Times.
Violets except the yellow.
Water mints.
Water Lillyes and moſt of the other water plants.
Winter Cherryes.
Willow weeds.
Woolfes bane.
Wormewood.
Yarrow.

N. 2. *The way of making Offsets by Art.*

Nature uſually provides this help of propagation, without the wit or induſtry of men, called to her aſſiſtance, but that not generally in all plants, nor alwayes in any one: and therefore I eſteeme it well deſerving any mans learning who delight in Gardens, to know any meanes to enlarge this way of propagation beyond the bounds it is carryed to by natures courſe. There is a pretty way (which in truth I firſt learned from Mr. *Bobart* our Phyſique Gardiner) for the making Offſets where nature never intended them; which is done by bareing the root of plants of woody ſubſtance, and then making a cut of the ſame faſhion with that which is made in laying: Into this cleft a ſtone muſt be put, or ſomething that will make the root gape; then cover the roote over three inches with mould, and the lip that is lifted up will ſprout into branches, the roote of the old tree nouriſhing it. When the branches are growen, cut off this plant with its Roote to live of its ſelf.

If you can, leave an eye on the lip of your roote, which you after the incition lift up; for the branches will then more ſpeedily and certainly iſſue out of the root ſo cut.

In Bulbous Rootes, *Ferrarius* makes offſets thus: If (ſayes he) a Bulbous root is barren of Offſets; either put it in better earth, or cut it upon the bottom in the crown of the roote whence the fibres ſpring, and that but lightly with your naile, and ſprinkle ſome dry duſt as a medicine to the wound; and the effect he affirms to be this, that ſo many wounds as you ſhall make, into ſo many offſets ſhall the genitall vertue diſpoſe it ſelf.

N. 3. *Rules for direction in taking off Suckers, or Offſets.*

Care muſt be had, that the Damme be not deſtroyed in her delivery from her new brood, which may eaſily be done, if too great a wound be made upon the ſtoole, or mother-plant, by tearing off the Suckers. Tis *Ferrarius* his peculiar precept about Anemonyes: That they be ſure as to take off ſuch Offſets that will ſcarce hang on, ſo not to teare off ſuch as hold faſt to the mother-plant, for that would be to the peril both of the offſet and motherplant. Yet I have ſeen the very ſubſtance of Sowbreads to have beene divided with a knife through the heart, and yet grow well on either part, when they have not afterward been over glutted with wet. Flaggs. Beares eares, Primroſes and Cowſlips, and generally all rootes, that are not Bulbous or tuberous muſt have, and doe require a violent ſeparation, but the leſſe the wound is, the better ſhall your plant thrive, and be leſſe ſubject to corrupt by the moiſture in the earth.

In the replantation there is required the generall care of young ſets, all plants of fibrous rootes are aſſured in their growth, by convenient watering, but for bulbous and tuberous the Gardiners hand is, and ought to be more ſparing, because that moiſture is a peculiar enemy to theſe plants, and often rots them, if it get into any crany of their rootes.

N. 4. *Examples of planting by Offſets.*

Licorice requires the richeſt & moſt forced ground, very deep, that there may be roome for the downright roote, light, without ſtones or gravell, and dry from moiſture: The ſets are made either from the runners that creep along the upper part of the ground from the roote, or elſe are taken from the Crown of the maſter-roote, and are ſet at a foot diſtance or leſſe in *February*, or *March*, according to cuſtome, though I ſuppoſe any time in the winter might as well ſerve the turn, the richer the ground is, the further they may be ſet apart.

Hoppes require to be planted in a very rich well oyled land, and not mooriſh, unleſſe the bog be firſt ell dreyned, the ſtronger the ſetts are, the more nmediately will proffit ariſe from the Garden, if ree or four inches about, they are ſo much the etter, let the center of the hills be ten foot removed ach from other,that ſo you may put the more poles on hill ,and both the ſun and plow may have free paſſage etween them : thoſe that have leſs ground make eſſe diſtances, and toyle their garden with the ſpade, nd put but three poles to a hill,whereas ſuch as plant or 10 foote diſtance,uſe four at the leaſt , if not five: n planting , which is thought to be beſt done , when e froſts are paſt,(ſome preſcribe *April* for the ſeaſon) here is nothing required but that they be ſet about he center of the place, intended for the Hill upon he plain ſurface of the ground in good mould, about hree, four,or five in number according to the bigneſs the Hill intended, and ordered with the uſuall ure of offſets : beſides this particular that as the ſets row the hill muſt be raiſed to their heads.

Saffron delights in a reaſonable good and dry light round , not extreamly ſoyled or moiſt . 'tis plantd cheifly in ſome parts of Eſſex , Suffolke, and beveen that and Cambridge, at Saffron-Walden. They e ſet in the manner of bulbous roots , being taken hen the bulbe is at the fulleſt, commonly about idſummer , the bulbs are ſet by a line , (that the eds may be weeded with a hoe) and that either with etting ſtick or by trenches made in the manner thoſe wherein garden peaſe are uſually ſowed. This res in the middle of the flower three chives,which the Saffron,to be gathered every morning early and yed for uſe , every ſecond or third year at the fureſt the beds muſt be replanted , and the offſets awn away;

The generall way of this propagation is to take the offſets that riſe from the bulbous and tuberous rooted plants, as Tulips, Anemones, Narciſſes, Crocus's, &c. & the ſuckers which from the roots of poplars, Elmes, Nuttrees, Peares, Burts, Nurſgardens, Kentiſh Codlings, Gooſeberryes, Roſes, Ruſcus, Calamus Aromaticus are very plentifully are drawn, and more or leſs from all mentioned in the Catalogue. N. 1. Chap. 2. and to replant them in the ſeaſons of ſetting, which are related in the proper chapter for that operation, into proper beds, and in convenient diſtances for their future education and growth.

N. 3 *Variety of colours, in what flowers, from what offſets.*

Our Gardiners reſpect moſt the roots of widdowes, for that they find by experience that they multiply the variety of Tulips not only from ſeeds, but from the offſets of theſe widdows: I my ſelf have ſeen admirable declenſions of them from their naturall purple and white.

The royall Crocus ſtriped gives now and then very pretty variety from its offſets, as ſometimes I have ſeen on the ſame roote an ordinary ſtriped Crocus and another of a perfect flame colour, though the variety here be not ſo great as in Tulips.

Concerning the manner of growth by Offſets there is little to be ſpoken particularly, their roots being actually made while they remaine upon the mother plant, and their growth being like that of other well rooted vegetables.

CHAP.

CHAP. 3.

Of propagations by ſtemmes, cuttings or ſlippes.

N. 1. A Catalogue of plants this way propagable.

Abrotonum Vnguentarium.
Balſamita.
Barberyes.
Baſil.
Baſilmint.
Bay.
Baume.
Box.
Brooklime.
Burts. and generally all ſuch plants as break out into protuberances like wares upon the bark.
ugle.
rnelian Cherry.
Many *Crowfootes.*
onas his woodwort being cut off neer the roote.
der.
vergreen-Privet.
rmanders.
illiflowers.
yſſope.
ſmine.
Kentiſh Codlings.
Knotgraſſe.
Lavander.
Lawrell.
Marjerome.
Marſh-mallowes. being taken up neer the roote.
Maſtique.
Mulberyes.
Nurſgardens.
Penny-royall.
Periwincle.
Pincks.
Polium monſtanum.
Prunella or *Selfe heale.*
Quinces.
Some *Roſes*, as the evergreen Roſe.
Roſemary.
Rue.
Sage, both Engliſh and French.
Savory.
Savin. in moiſt ground, and ſhadowy
Scordium.

Southernwood.
Spearmints.
Strawberies, and generally all plants that have joynts upon creeping ſtrings.
Thime.
Tripolium.
Veronica erecta.
Vines.
Violets.
Wall flowers.
Watercreſſe in water.
Withy.
Willow.
Woodbine.

N. 1. *Explication of the Manner of propagation b ſtemmes cut off from the Mother-plant, or ſlip't b example and Rules for particular direction.*

For example, I ſhall chuſe to inſtance in Gilliflowers or Carnations, for which flowers obſerve this order, Seeke out from the ſtemmes ſuch ſhoot onely as are reaſonable ſtrong, but yet young and no either too ſmall or ſlender, or having any ſecond ſhoots from the joynts of them, or run up into ſpindle, cut theſe ſlips off from the ſtem or roote with a knife either cloſe to the maine branch, if it b ſhort, or leaving a joynt or two behind, if it b long enough, at which it may ſhoote anew: whe you have cut off your ſlips you may either ſet the by and by, or elſe (as the beſt Gardiners uſe to doe caſt them into a tub of water for a day or two, the in a bed of rich and fine mould, firſt cutting off you ſlip cloſe at the joynt, and having cut away the loweſt leaves cloſe to the ſtalke, and the uppermoſt eve at the top, with a litle ſtick, make a little hole in th earth, and put your ſlip therein ſo deep that the upper leafe may be wholly above the ground (ſome uſ to cleave the ſtalk in the middle, and put a littl earth or clay or chickweed, which we more uſe, withi the cleft, this is Mr. *Hills* way in Sir *Hugh Pla*

bi

ut many good and skilful Gardiners doe not uſe it; hen cloſe the ground unto the ſtemme of the lant.

As for the time, If you ſlip and ſet them in *Sep*ember, as many uſe to doe, or yet in *Auguſt*, as ome may think will doe well; yet (unleſſe they be he moſt ordinary ſorts which are likely to grow at ay time and in any place) the moſt of them, if not all, vill either aſſuredly periſh or never proſper well: the eaſon indeed is from the beginning of *May* to the niddle of *June* at furtheſt.

Ferrarius Lib. 2. c. 15. ſayes, that from the moneth f *February* to the middle of *March* (viz) in the time f their germination, is the beſt time to ſlip this flowr. He neither will have them ſlipt, nor twiſted in he Roote, nor Barly put under them to raiſe adulteous fibres, but only adviſes that they be cut off in a oynt. The truth is, both the Spring and Autumne re good Seaſons for makeing out Roots, the latter equires that the ſlip be ſo early ſet as that they may ave time enough to take Roote, before the coldneſs f winter: The former, that the plant ſet in the pring, may have taken Roote before the Sun riſes o emit violent and parching heats, which are geneall Rules for Vernall and Autumnall ſettings.

Woody plants that bear leaves muſt be taken off, & lanted ſome time between the fall of the leafe and he ſpring, ſome preferre the planting them in the eginning, ſome at the going out of the winter aout the beginning of *February*, Immediately hen the great froſts breake, at the firſt towardneſſe o ſpring is a good ſeaſon according to generall beeife.

Experiments made of the ſucceſſe of the cuttings off dive's plants ſet in water.

Becauſe in ſome diſquiſitions of naturall Philoſophy, there may ſome matter of argument ariſe from experiments of the converſion of water into nutriment and ſubſtance of various and very different plants, whereof ſome are hot, others cold, ſome eſteemed of a freſh, others of a ſalt nature, ſome in regard of mans body of healing, others of excoriating and bliſtring qualityes, ſome ſpecifiques for the head, and the diſeaſes thereof, others for the heart, and others for the wombe: I ſhall ſet down the truth of ſome few trialls concerning the growth or corruption of ſuch cuttings, of divers Vegetables as without roots I kept in my chamber, in Vialls of water. Not willing thence to make any motion towards the reſtauration of the ancient doctrine concerning the production of all things out of water, or to rake up the ſcatter'd judgments of the once renowned *Thales*, which he made from the obſervation of the generation of fiſhes, and petrifaction by this element; as likewiſe from the influence (for he was aware thereof) and cauſalitie it has in the production and noriſhment of vegetable, and (if not immediately) by conſequence of animall bodyes. Nor deſiring to make from theſe experiments (though I beleive the inſtance may be as well proper as ſpecious) any argument for the more faſhionable opinion of *Epicurus*, by ſhewing the various productions that may be made by the divers ſhufflings and poſitions of that which has the repute of the moſt pure and defecated element, but clearly intending to keep to my task, which is Hiſtory, and rather to ſerve, than to be the Philoſopher: I in ſhort

rather

ive the Reader this account: That *May* 1658, in laſſes of water the plants following grew from cut-ngs, and made themſelves roots in the water, by ame, they were Balſamita minor, Mints, Sedum mul-ifudum, Penny-royall, Bugle, Prunella, water creſſe, urple-graſſe, Periwincle, Dorias his wound-wort, row-foot, Brooklime, Marſh-mallows, Lawrell, cordium, Tripolium, Knot-graſſe, Nummularia, inima, Baſil-Mint, Curl-mint, Horſ-mint, Panax-oloni, Feverfew, and ſome others which I kept no ccount of, I have had at other times.

Plants that upon triall made by cuttings *May* 658, did not grow being placed in Vialls of water vere Mugwort, Roſemary, Stock-gilly-flowers, A-aternus, Lavander-cotten, Sage, Armeria's, Camo-aill, Roſemary, Polium montanum.

Stock-gilly-flowers, Bawne, Tanſy, Groundſel, avander-cotton, Sage, Majorane, being likewiſe et in glaſſes of water diſſolved into a muſcilage, and o corrupted before they attained to any roots.

Plants that were corrupted by the water in ſome part of the ſtems and ſo dyed after leaves ſent orth and roots ſhot, were, Baſil, Mint, Marſhmal-ows after it had grown a ſpan, Panax-coloni, Bal-amita minor, after ſix weeks growing, which made ne doubt whether there were not the ſame reaſon of he dying of theſe plants that there is of grafts of Pears upon Apples, or Apples upon thorns, which grow for a while, it may be ſome years but ſurely dye before they arrive to any Maturitye: and ſecondly whether this reaſon was not the unlikeneſſe and diverſity of parts between the ſtock to be nouriſhed, and the nouriſhment appoſed thereunto, for though ſome dyed after leafe and growth made, as purplewort parti-

cularly

ticularly by running into a Muſcilage; yet generally there appeared noe ſuch evident cauſe of their failing.

Plants that increaſed in weight, being planted in the water, were theſe, and the quantitie thus much.

Sedum multifidum in a moneth increaſed in weight, half a Scruple: Scordium as much in a fortnight. Donas his woundwort, grew in 6 weekes, gr. 13. Bugula in ſome what leſſe time gr. 15. Watercreſſe gr. 25 in a moneth. Ranunculus half a Scruple in 6 weekes, and Periwinckle as much. Prunella, Brooklime, Scordium, and moſt of the ſorts of mints got weight proportionably.

N. 2. *The manner of growing by cuttings.*

Such who deſire to obſerve the working of Bees, get Caſements to their Hives, that their eyes may not ſuffer impediment from the darkneſs of the place, for prevention of the ſame hinderance the uſe of beds, of a Diaphanous ſoyl, in as Diaphanous bounds, or plainly of water in a glaſſe, I have found a proper remedy: and ſhall therefore from my obſervation of the growth of theſe particulars deſire the reader will imagine the reſt, or judge them alike, as truly ſo, what I remember I have always found them.

For the manner of plants growing by water, I obſerved that thoſe plants that had many joynts eaſily grew and put forth roots only juſt at the joynt. Knot-graſſe, Crow-foot, Panax-Coloni, all ſorts of Mints, Penny-royall, Scordium, Bugle, Brooklime, Periwincle, which I conceive to be the reaſon why in ſetting them the practice is to cut of the plant juſt in a joynt, for ſo the roots immediately ſpring thence and no part of the ſtem corrupts, which it would, if it were cut of at greater diſtance.

In thoſe herbs where there were no exact joynts, the roots ſprung forth under ſome buds, as in Tripolium, Donas his woundwort, Marſhmallows.

Every root that was made came forth firſt very white and ſingle, but afterward in very handſome order and proportions, from thence aroſe other fibres ſtriking every way in the water, where the ſide of the Vialls made no impediment to the growth of the ſpurres iſſueing from the firſt and originall root.

N. 3. *Of propagation by the ſowing ſmall and almoſt inſenſible parts of Vegetables.*

Tis a generally received truth from common experience, that if the water wherein muſhrooms have been ſteeped or waſhed, be powred forth upon an old hot bed, or the parts and offalls of Muſhroms broken to peices bee ſtrawed thereon, that from theſe parts as from a ſeed, there will ſpeedily ariſe ſtore of Muſhroomes, every ſmall particle of that imperfect plant being rather beleived ſeminall in the ſame manner as the boughs of Quinces &c. than that as in Adianthum, and diverſe fernes, nature has diſguiſed any particular ſeed clancularly to be the mean of Propagation in it.

Kircher the Jeſuit affirmes that if you take an herb and ſhred it ſmall, or reduce it into Aſhes, theſe being ſo ved an herb will ſpring thence of the ſame ſpecies with the Aſhes or ſhreds ſowen: I thought that newes upon my firſt reading was too good to be true, and upon tryall made in very many ſorts, could never make this way of propagation hold effectuall to the producing of any plant, and if it were true it were an ill Cuſtome the Gardiners uſe to ſow their ſeeds with a great quantity of aſhes which are made from the wood or ſtraw and leaves of Vegetables generally and a wonder that they never ſhould come up amidſt the ſeeds moſt ſeaſonably ſowed.

Chap. 4.

Of Propagation by laying.

N. 1. *What plants are this way encreaſed.*

The plants that are uſually propagated this way, are Vines, Woodbines, Jaſmines, Mulberies, Savin: Evergreen privet in Woods all ſorts of Willowes and Sallowes to fill up bare places Carnations, Gilliflowers, roſes, Horſ-cheſnut and all thoſe plants that will grow by Cuttings will this way grow with much more eaſe, by care and good watering gardiners doe apply this way with profit to ſuch plants as cannot well by any other meanes be encreaſed for want of ſeeds and offsets, and by reaſon of the repugnancy of their nature to grow either by cuttings or inſition.

The example of this manner of Propagation.

The moſt uſuall flower to be laid in Gardens, is the Gilliflower which every Gardiner here uſes, and is thus performed; Take thoſe ſlips yon intend to lay, and cut the ſtalk juſt under that joynt of the ſlip, which is next the roote or middle ſtem, or under the 2d. joynt half way through the ſtalk: then ſlit it upward to the next joynt from that under which you made your firſt inciſion, and put the top of a Carnation-leafe, or any other thing to hold open the ſlit;

(though that be not altogether ſo needfull , for the cut being made on the lower ſide, and the Slip being towards the root bent down gently , as the manner is and the top of the ſlip raiſed with mould,the ſlip will be open of its own accord and remain ſo if you place it well) at the firſt ſome peg down the middle of the ſlip with ſticks, that it may not riſe from the poſiture in which tis firſt lay'd , you muſt remember to put good earth , enough to mould up your new Nurſery, and to water it upon all occaſions , and then in 7 or 8 weekes you may expect Rootes.

Requiſites for the manner of laying.

1. To Laying , tis profitable if not neceſſary , that you (in the ſeaſon of doeing this operation) cut the thing you lay, much in the manner you cut Gillyflowers, in laying them,unleſſe in ſome plants that take any way as Vines, and 'tis ſo much the better if in Roſes and other Layers of a woody ſubſtance, with an Awle you prick the ſtock at the place laid, as it is done in propagation by Circumpoſition.

2. Another Requiſite is, that dureing the time of drought they be continually watered , and kept moiſt , otherwiſe they will make no exact roots perchance only a kind of knob or button full of freſh ſap upon the tongue of the cut in the branch layd down , yet I have found theſe branches cut off with watering in the ſummer to grow well enough after their tranſplantation.

3. The ſeaſons moſt fit for this operation , is, in the beginning of the ſpring or declenſion of the torrid heat of ſummer , that they may enjoy the moiſtneſſe of ſuch ſeaſons moſt proper for the enticeing

forth of roots, and moſt ſafe from exceſſive heat or cold.

N. 1. *Of propagation by Circumpoſition.*

Circumpoſition is a kind of laying, the difference is, that in this the mould is born up to the bough which is to be taken off: in laying the bough is to be depreſſed into the mould. Wee uſe this moſt in Apples afrer this manner, firſt break the bough a little above the place where tis ſeparated from the main ſtock or arm, ſo that the hat or other Veſſell that holds up the Mould to the inciſion or diſbarked place may reſt upon the ſtock, then ſlit an hat, an old boot, or take any ſtrong peice of old courſe cloath, tying or ſowing it ſo ſtrongly that it may be able to hold up the mould to the inciſion, ſometime before you fill this cap with mould, remember with an awle or point of a penknife, to bore two rowes of holes upon the upſide of the cut about half an inch or more, one from another, then fill it with good mould, or ſuch as is agreeable to the tree you work upon, and in the heat of ſummer, water it now and then, The time of this operation is not in the ſummer, as Mr. *P.* ſuppoſes (which miſtake was ſufficient cauſe why he ſhould not like the experiment) but in the ſpring before the ſap riſes, particularly in *Febr.* or the beginning of *March.*

Such plants are propagable this way that might take by laying, but that the branches are too farre riſen from the ground to be laid along therein; and therefore it becomes neceſſary, ſince they cannot ſtoope to the earth, that the earth ſhould be lifted up to them.

N. 5. *Of the manner of growth by Circumpoſition, and whether thence an argument may be made for the deſcention of Sap.*

Concerning the manner of growth by Circumpoſition I ſhall only make this remark, whereas it is ſuppoſed by ſome, that the roots are made above the disbarked place, by the deſcention of the ſap, which is ſuppoſed to be at the fall of the leaf, I have found experience very contradictory to their ſuppoſalls; for the leaves fall not till after Michaelmaſſe; and nature proceeds to the germination, and encreaſe of roots from the ſpring all the ſummer long, ſo that nothing can be argued rightly from this operation, or from the effect and product of nature thereupon for that opinion, which makes the ſap to be every winter repoſed in the roote, as in a large receptacle, and of its deſcention thither after every Autumne. If it were there as in a repoſitory, it were a wonder that roots ſhould be drier in *Decemb.* then in *May*, or *June*, and ſenſibly more devoid of juice. And if it did deſcend after Autumne, how could it aſcend at the ſame time? That it doth then aſcend is plain from this experiment; Take up a tree, or other vegetable, in the fall of the leafe; the leaves will wither, and the bark begin in a little time to wrinkle: then ſet it again in a proper ſoile, well watered; the effect will be that the leaves will recover freſhneſſe, and the bark wax plump and the body frime, and full as before, which could not be but by a freſh ſupply of aſcending ſap, which might fill up the pores made by the weather, and exhalation of the ſunne. I am contented to beleive that the ſap is in winter where I ſee it to be, (viz) on the body of the tree coagulated, or cruſted into a new coate, encompaſſing the whole, which was not extant the year before , and on the top faſhioned into new ſhuits which viſibly appear the product of that matter the place of which is aſſerted to be elſewhere and not I am as well contented not to ſuppoſe it abideing where upon the moſt ſedulous inqueſt it cannot be found.

Chap. 5

Of Inſitions.

N. 1. *Of Grafting in generall and particularly of ſhoulder-grafting , Whippe-Grafting , Grafting in the cleft and Ablactation.*

Grafting is an Art of ſo placeing , the Cyon upon a ſtock that the ſap may paſſe from the ſtock to the Cyon without impediment. For the right operation of which it is a cheif remarke, that the ſpace which is between the bark and the ſtock is the great Channell for conveiance and keeping of ſap ; ſo that every one that grafts well ſo orders the manner , that theſe ſpaces be ſo laid that the paſſage may be eaſy and direct from the ſpace under the bark of the ſtock, to the ſpace under the bark of the Cyon

This may be done ſeverall ways.

Firſt by ſhoulder grafting , the operation of which Mr. *Auſtin* do's well deſcribe thus : Cut off the top of the ſtock in ſome ſmooth ſtreight place that may anſwerable to the ſtreightneſs of the graft when ſet on; then prepare the graft thus, obſerve which ſide is ſtraighteſt at the bottome, or bigeſt end, ſo that it may fit the ſtraight part of the graft when ſet on, then cut one ſide only of the graft downe aſlope about an inch long or litle more, and cut through the bark at the top of the cut place: and make it like a ſhoulder, that it may reſt juſt upon the top of the ſtock, but cut not this ſhoulder to deep, (only through the bark or litle more, and the leſſe the better) but cut the graft thinne at the lower endof the cut, ſo that it may decline in one continued direct ſmoothneſſe, without dints, ridges, ſpaces or windings all along the ſlope, from on ſide of the Cyon to the other, otherwiſe it cannot joyne in all places to the ſtock. The graft being thus prepar'd, Lay the cut part of the graft upon the ſtraight ſide of the ſtock and meaſure juſt the length of the cut part or ſlope of the Graft, and with your knife take off ſo much of thebark of the ſtock, (but cut not away the wood of the ſtock) then lay the cut ſide of the graft upon the cutſide of the ſtock, and let the ſhoulder of the graft reſt directly upon the top of the ſtock, ſo that the cut parts may joyne even and ſmooth all along the inſide of the barke of the graft, being placed upon the inſide of the bark of the ſtock, and ſo joyne them faſt together with ſome ſtrong Ruſhes or flags, and clay them on every ſide that noe Rain get in.

If the ſtock be very little the way of Grafting is the ſame, only excepted, that in this caſe there muſt ſome of the ſubſtance of the wood be taken away, that the graft in it's ſlope be not too big for the cut in the ſtock, in which operation ſo much there muſt be taken from the ſtock, that the inſide of the barke of the graft may anſwere the inſide of the bark of the ſtock, which being done, all things elſe are the former way performed. This is call'd whip-grafting, and is appoſed to the former, when no wood is cut from the ſtock: for ſhoulder-grafting 'tis required, that the ſtock exceed not in bigneſſe, for then the bark being taken from it there will not be a right application of the ſap-channells of Cyon and ſtock required in the definition of grafting, the disbarked place in the ſtock neceſſarily being much greater then that in the graft. Yet if the ſtock be not 3 inches circumference it will doe very well. The one of theſe wayes is called ſhoulder-grafting, becauſe the upper end of the downright cut is intended and made fit to leane as it were upon the ſhoulder of the ſtock: The other Whip-grafting, becauſe the operator only makes his ſtreight-down right cut and tarryes not to indent it at all.

Some think this way fit only for great ſtocks: but I have grafted ſeedlings this way, ſo ſmall that the Cyon was put in like a Wedg, and was very even to the ſtock on each ſide; neither ſtocks nor Cyons being neer an inch round: but if ſmall plants are this way grafted, they muſt be tyed about after the former manner uſed in ſhoulder-grafting; the wound made by cleaving is very quickly made up, and cemented by the ſap in grafting a young ſtock, whereas in old it is quite contrary,

The way of grafting in the cleft, has been of long uſe, and is generally known to all gardiners, The ſtock muſt be cleft in an even place, and the cleft ſo prepar'd with your knife, in the cleaving, that the ſides be not ragg'd, both ſides of the graft are to be cut down ſlopewiſe, and ſhoulders made or not made at pleaſure; M. *Auſtin* well adviſes that the outſide of the graft be bigger then the inſide, unleſſe the tree be big, but if it be ſo great as to pinch the graft much;

then to make the inner ſide thicker a very little, that ſo it may preſerve the outſide from being ſo pinch't, as to make the bark of the Cyon ſit looſe, and not receive the ſap from the ſtock into the common channel,in ſuch manner as is requiſite for the begetting of a continuation between them.

There are other ways of grafting very excellent; as in a great tree, to prepare your Cyon as for the ſhoulder-graft, and then to take off ſo much of the bark, the head being before cut off as that the ſlope may juſt fit the diſbarked place, as in ſome of the figures of Inoculation. Sometimes the Cyon being ſo prepar'd we raiſe up the bark,as in the other figures of Inoculation; but to cut it off fit,I count the beſt way, and have often practized with univerſall ſucceſſe.

Ablactation is the ſame with grafting, ſaving that in that way the Cyon remaines on its own ſtock, and on the ſtock you graft together. For the ſtock you graft, being planted by the tree from which you have your Cyon, you diſbarke and cut the Cyon, ſo that the inward part of its bark may anſwer the like diſbarked place in the ſtock, ſo they being bound up together, and not ſeperated till you are ſure they are ſurely incorporated, at which time the Cyon is cut from its own, and lives only by the other ſtock.

It is an ordinary imagination that by this way of Ablactation, Heterogeneous conjunctions may be made to proſper, but thoſe that conſider that the cauſe of the impoſſibility of diſſimilar plants thriveing by any way of Inſition, is not the difficulty of their firſt uniting, but the diſability of the root and ſtock to nouriſh the head with convenient nouriſhment, will not eaſily admit ſuch a fancy; Pears upon Apples, and Services; Apples upon Thorns, and the like plants will with eaſe take, and continue in good growth longer then ſuch time as is required that the Cyon ſhould depend upon the mother plant in Ablactation for the faſtening of it till cementation be made; But after a perfect conjunction, and great ſhoots ſpring out, they (almoſt conſtantly notwithſtanding the greateſt care) will dye, which is an evident ſigne that this way can adminiſter no help, it only providing that nouriſhment be not wanting to the firſt moneths,and not ſecuring them from the danger of wanting for the future, fit and wholeſome Nutriment for their maintenance and growth.

N. 6. *What Plants take on different kinds.*

This is a generall rule for grafting, Inoculation Ablactation, and conjunction by penetration, or an ſuch way of propagation, that the Cyon or thing implanted be of like nature to the ſtock, to tell wha neerneſſe in every kind is enough, is matter of grea Art; 'Tis known that Plums will not grow upo Cherries, nor Peares upon Apples for many years though for a while they may proſper.

I find that divers plants will take by enarching c Ablactation,that will not take by grafting; ſo Grape as the early red upon the great Fox-Grape; Apricot alſo and Peaches, which being ſecured upon the own ſtocks, will admit implantation unto anoth alſo,and take unto it, which by grafting I could neve bring them to.

The ſtrangeſt conjunctions that we obſerve to agre are the Whitethorn with the Pear, Quinces with th Pear, the Pear with the Quinces, the Medlar wi the Whitethorn, the Apricots with Plums that a of full ſap, and ſometimes upon hard ſcurvy Plums, moſt uſe the White-Pear-Plums for that purpoſe; I find not but ſome other are as good (viz) the Primordian, Muſcle, Violet. And it is true, that all roſes cement and continue well upon bryers, as on the ſweet-bryer, dogroſe, I have Cherryes that grow upon Plum-ſtocks which is Sir *Hugh Plates* experiment from Mr. *Hill*. p.113. and Currans upon Gooſeberries: what duration they may be of I expect to learn. I am not convinced by experience that Pears upon White-thorn are worſe in their ftuit but if ſo I ſhall preferre Apple-kernells before Crabs for a Nurſery. I have taſted very excellent Katherine Pears without ſtone or hardneſſe, that came from a Thorn-ſtock: nor were they ſmaller or harder (which Mr. *Taverner* aſſerts) then ordinary fruit upon the proper ſtock, however I adviſe that ſuch as ſhall for want of Pear, uſe Thorn-ſtocks, that they graft very low, for otherwiſe the Thorn not growing proportionably to the graft, will cauſe the graft to decay, being never able to grow thereon, unto the bigneſs uſuall in Pear trees.

There are almoſt infinite ſtoryes of ſtrange conjunctions which urge earneſtly for credit, ſome of inciſions made upon animall bodyes: The Lord of *Piereſch* had a preſent made him of a Plum-tree branch which bore bloſſomes and leaves, which ſprang from a thorn that grew in the breaſt of a Shepheard, this Shepheard having got this Thorn by falling upon a plumtree. Raw ſilk has grown on the eye brow of a Lady, mentioned by *Borellus*, obſerv. 10 cent. 1. being drawn through the fleſh to ſtitch up the lips of a wound there, and the growth was ſo conſiderable that it required frequent cutting; and there was a Spaniard lately had a bramble that grew out of his belly. The improvement that from theſe and the like ſtoryes, the Author in the cited place propoſes, is, That with the bliſtering plaiſter the bodyes of divers beaſts be excoriated and planted anew with ſilke, woole, or the like, where it may likely grow to the great advantage of the owners. When this has well ſucceeded, I ſhall propoſe another raritie from the firſt ſtory (viz) That ſuch who live about Glaſſenbury plant upon them ſelves ſome of that famed thorn that beares leaves on Chriſtmas day; for if the button moulds, according to the ſtory, made from the wood, kept their time of blowing upon the doublet, through the ſilke of the button, doubtleſſe the plant grafted upon the fleſh may grow through the very doublet too. Or in the mean time I ſhall wage on the ſucceſſe of my improvment, aſmuch as the obſervator ſhall doe on his.

N. 2. *Rules for Grafting.*

The time of grafting, poſſibly is any time of the winter; I have ſeen Apples grafted in *November*, & at *Chriſtmas*, and yet thrive very well; but the beſt time is, that which immediately precedes the ſpring: if poſſible let the Cyons be gathered before the trees ſhoot their buds though ſome will grow now and then, notwithſtanding they be ſprouted, 'Tis no matter though the ſtocks are budded; I have at Eaſter grafted above an hundred Apples and Pears without any fail.

The beſt way to keep grafts a long time, eſpecially in pretty hot ſpring weather, is to wrap them all in wet moſſe, or cover them with earth.

Lute is made with horſe-dung & ſtiff clay well mix'd together; Mr. *Auſtin* adviſes, that in ſhoulder-grafting, the Cyon may be put upon the Weſt or South-ſide of the ſtock, becauſe if ſo, thoſe winds which are moſt dangerous cannot ſo ſoon break off the grafts as on the other ſides.

If you would have a ſpreading tree, put in a long Cyon; if a ſtraight tree, put on a ſhort one, or let but one bud thrive.

Good bearing trees are made from Cyons of the like fruitfullneſſe. Unbind grafts when they have ſhot great ſhoots, that the binding eat not into the tree, ſtrengthen thoſe that are weak with a ſtick tyed above and below the grafted place, like Splinters to a broken bone, till the cementation be made and confirmed.

If you would have ſtore of any fruit quickly, cut off the head of an old ſtock, and graft thereon.

To Trees that bear great heads, and are of a faſt and binding bark, ſuch as Cherrie trees, ſome hard Apples, and other kinds of great fruit-bearing, and other plants, it is eſteemed neceſſary by ſome to put in more grafts than one, leaſt the ſap finding not way enough, the tree receive a check and periſh by the diſappointment of the ſap. However this reaſon may hold, certainly 'tis prudence to put in more Cyons than one in ſuch trees, leaſt that one failing, the ſtock likewiſe dye, being bark-bound and not able to put out a germen.

Cyons are beſt choſen from the faireſt, ſtrongeſt, not under-ſhoots or ſuckers, which will be long ere they bear fruit, which is contrary to the intention of grafting; the prime uſe of which I beleive rather to be the expediting, than the improvement of fruit.

Inoculation is performed by takeing off that eye or little bud which containes the beginning of a bough provided for growth in the next ſpring, and planting it ſo upon another ſtock that the ſap of the ſtock may without impediment or interrupt courſe paſſe unto the little eye (as I may call it) imperfect or inchoate bough, and ſerve it for Nutriment: For which operation the Bark muſt be cut either downright, with a croſs cut on the top; the downright cut being about an inch long, and the croſs cut onely big enough to ſerve for the eaſie lifting up the Bark: and then the ſides being lifted up with a Knife or Quill, the Shield is to be put in, and the lips or ſides of the Bark before lifted up, are to be bound down upon the ſhield: Or the croſs cut may be in the middle, and then the ſhield is to be made picked at both ends (otherwiſe in the forementioned way, the lower end onely is made picked) and the four lips are to be lifted up for the letting in the ſhield. Others cut the Bark clean out in an oblong ſquare, and cutting the ſhield exactly in the ſame dimenſions and figure, apply it to the diſbarked place in the Stock. Others cut their ſhield in the mentioned Figure, but take not off all the Bark anſwering the oblong ſquare ſhield, but leave the lower part on the ſtock, under which they put the lower end of the Shield, and binde it down thereon. Other varieties there may be, and are uſed, ſome more of which are delineated in the annexed Figures: To take off the Bud clean from the Cyon, the beſt way is, to draw the lines of your ſhield through the Bark with your Knife, and to take off the reſt of the Bark thereabouts, leaving onely the intended Shield thereon.

Having ſo far prepared your Bud before you take it ff, remember to open the Bark of the Stock, for therwiſe the ſhield will take hurt by the Air, which uſt be placed upon the Stock with all ſpeed, and ound with ſomething that may be of a yielding nature. The beſt way of taking off Buds, is with a Quill which is cut like a ſcoop, the one half, or two hirds, taken away for about an inch in length at the end: In taking the Bud off, be ſure not to leave the Root behinde; for bindings, uſe any ſorts of ſoft Ruſhes that will hold tying, long ſlipes of Linnen or Yarn.

I prefer ſuch binding as need not be taken off till I expect the ſpringing of the Bud, for there is much peril in premature looſing the bonds, yet 'tis neceſſary to unbinde whenſoever the Stock ſwells about the place of Inoculation. The time of Inoculating is, from the firſt time you can get ſtrong Buds that will come off after the froſts are gone in the Spring, till ſuch time as that the Buds then implanted may be faſt cemented before Froſts return in the Winter. You may Inoculate with the laſt years Buds, which are ſtrong commonly, and fit to be put in at Eaſter.

Other Rules for Inoculation are, That the Cyon from whence you take the Bud be not weak, for then the ſhield will be ſo too, and likely bow or double in the putting in, which is a great reaſon why the double yellow Provence Roſe is ſo hardly propagated by this means; other Roſes, as the Roſa Muudi, Velvet, Marble, and Apples, Aprecotes, and the like, very eaſily, that the Bud be not ſprung out much before it be taken off.

If you carry Buds far, expoſe them not to the

Sun, but cut off the leaves, or ſome part of them, and wrap them up in wet Moſs or freſh leaves, to keep them cool.

If the Bud take, in the *March* after cut off all that groweth above it, ſtripping away all the Buds that come forth elſewhere, or at the leaſt all ſave one: ſome conceive one neceſſary for the drawing up the ſap.

Chooſe ſtrong Buds for Inoculation, and ſtrong Cyons for grafting, and put them always on a ſmooth place of the ſtock.

Any thing may be propagated by Inoculation, unleſs the ſlenderneſs and weakneſs of the Shield hinder, that can be by grafting. Apples and Pears, though ſeldom Inoculated, certainly take. I have ſometimes uſed to cut off the ſhield with a ſharp knife flat, with part of the Wood thereto adjoyning, and put it in ſo; But this way, though many take, eſpecially in Apples, yet the ordinary way ſeems better and more certain. Some take off Shields without a Quill, flipping them off with their fingers; but this is the ready way to leave the root of the Bud behinde on the Cyon, which being wanting, the other part of the Shield is unprofitable.

A pair of Compaſſes made flat at the ends, and ſharp with edges, is an apt Inſtrument to cut away Bark for Inoculation, both for a true breadth and diſtance all at once; and ſo likewiſe with the ſame you may take off the bud truly to fit the ſame place again in the ſtock, Sir *H. P.* p. 113.

N. 3. Kirckers *Experiments concerning Inſitions examined.*

Kircker, a Learned man, the *Pliny* of his time, ter he had reproved the falſities in *Wecker*, *Alexius*, ıd *Porta*, who had aſſerted a change of colours and ıre variety of flowers, by ſteeping thoſe roots in juices hoſe colours were deſired, ſeems to me as much to e blamed, in that he writes ſo confidently of things hich are as much like Paradoxes, and equally gain- id by experience.

He ſays, that he doubts not, but has from experi- ıce theſe effects; That a white Roſe, grafted upon a d, will bring that Roſe we call Roſa Mundi, or a lo ver both red and white. This I have often prov'd lſe by mine own tryal: That a Gelſimine grafted ı a Broom, will bring yellow flowers like thoſe of ıe Broom; That I tryed, and could not make to row, ſo far it was from bearing any Flowers, *v. Kir- ver: ars Magn. p.* 13. *C.* 6. But that Jaſmine upon ıſmine will grow and thrive, my own and others ex- erience can atteſt.

The ſame Doctor, in another Book of his, *De Magnete*, where he has many good Eperiments a- out that Stone, yet as to his φυτομαγνήτισμος, either e is out, or there is greater difference betwixt the ountrey where he tryed his experiments, and *Eng- nd*, then I can imagine; I have tryed Mulberies ı Beech, Quinces, Apples, Pears, Elms, Pop- rs, and by grafting they would not take, yet he af- ms they take eaſily; and more, that Mulberies are conjunction with white Poplars, made to be of a hite kinde, and bear white Mulberies; That Pears being grafted on a Mulbery, being a red colour'd Pear, ſuch I ſuppoſe we call the Bloody Pear, and that a Peach being Inoculated on it, it ſends forth a bloody Peach, are his aſſertions, which conjunctions I ſee will not with us take, but if they would, I could promiſe my ſelf no greater alteration of colour thereby, then I finde in the Flowers of Roſes, which I have tryed in very many different ſorts, and experienc'd to follow the Cyon without any participation of colour from the ſtock.

I having heard the ſame relation made of changing the colours of Tulips, by Artificial grafting the Bulbs of the white and red, and other colours, by proportionable indentments in each Bulb, tryed it this year in divers Roots, and made the Inſitions, and put together the parts as artificially as I could, according to the rules here given; but the event is, that the Bulbs come not up at all, but die upon the operation.

Num. 4. *The maner of growing by Grafts.*

'Tis prov'd by experience, that there is every year a new coat of Wood made to every thriving Tree, by appoſition of ſap hardned into a thin Board (as I may call it) inſomuch that I have known divers Woodmen, that would boldly aſſert the determinate number of years, that any Oke, or other Wood, has thrived in, by the number of thoſe ſeveral diſtinct Rings of Wood that are to be counted from the middle or center of the Tree, to the outſide of it, it being credited, and that I think with reaſon, that every one of theſe Rings aroſe from the appoſed and hardned ſap of every ſeveral year.

Now in grafting upon a frim ſtock, it comes to

aſs, that the ſap of the ſtock is appoſed to the body
the Cyon, and ſo incloſeth the Cyon with the laſt
at of the whole Tree, that there is, as it were,
ne and the ſame part of new Wood, that doth cloſe-
encompaſs the whole, both Stock and Cyon,
hich when harden'd, grows to be ſtrong, and of the
me uſe that ſplinters are to a broken Bone; and
ardners wiſely provide for the ſtrengthning of the
ompagination of the Cyon and Stock, until this ſap
e incruſted to a hardneſs; when the firſt year of
heir grafting, they do not onely binde up the Cyon
the Stock, but uſe ſplinters of old Wood, that
either the winde, or other accidents, may diſlocate
hat with Art was joyned together. This firſt, for
he maner of conjunction and faſtning of the Woods:
Nor do I make any difference between Grafting and
noculation, becauſe I am perſwaded, that as there
in every Seed an actual Plant, ſo there is in every
ud an actual Bough, and that a Cyon and a Bud
iffer but as a greater and leſſer branch.

But how the ſap of the Stock; ſuppoſe White
horn can ſerve to make the Wood, Bark, Leaves,
nd Fruit of its Cyon, ſuppoſe a Pear, is a difficult
ueſtion: For grant there be an elective attraction of
ap from the earth; yet how ſhall a white Thorn
hooſe that which is fit for a Pear? My thoughts are,
hat for thoſe who maintain election of ſimilar parts,
were beſt to ſuppoſe a great likeneſs in all Grafts
nd Stocks, as to their inward nature and parts,
hough not outward figuration; and there being this
ikeneſs in the ſubſtance, it will not be hard to con-
lude, that the Cyon, by altering the poſition of the
ame ſubſtantial parts, may make to the ſight, ſmell,
ouch, taſte, a thing of another faſhion.

For thoſe qualities that affect the ſenſes vary often in one and the ſame thing: The Apple in the beginning that is without ſmell, of ſowr taſte, green colour, hard to the touch, ſhall in a little ſpace be fragrant to the Noſe, ſweet to the Palat, of a golden or ruddy colour, and ſoft to the feeling: And in a thouſand inſtances 'tis found, that ſeveral poſitures of the ſame parts, ſhall produce ſeveral oppoſite colours, and other ſenſible appearances in the ſame thing: There is no inherent colour, either in the infuſion of Galls or Vitriol (though limpid they are not) ſo dark or deep as to come near the blackneſs of Inck, which notwithſtanding, being mixt, they produce. Two other infuſions of like colour, would not upon mixture ariſe to ſuch an effect, becauſe not able to diſpoſe each others particles into ſuch poſitures. Spirit of Vitriol, though without colour, diſpoſes the parts of this Inck ſo as to deſtroy the blackneſs; Oyl of Tartar reſtores both poſition of parts and priſtine colour; and that it ariſes from different poſitures, may be argued, becauſe there is a viſible motion, ſtriving, and local mutation in them, before theſe laſt effects are produced; and 'tis plain, that when the Inck, by reaſon of the ſpirit of Vitriol, diſappeared, yet all the parts were there, for elſe it will not be imaginable how a limpid Liquor, as Oyl of Tartar, ſhould reduce the colours which it does not by it ſelf generate, as it is plain, becauſe reſtoring Letters written with Inck, and taken off with Spirit of Vitriol, it makes no blackneſs on the Paper, ſave onely upon the Lines of the Letters: Theſe two limpid Liquors likewiſe, being put together, turn into a good conſiſtence and milky colour.

But he that deſires more inſtances of this kinde and
atter, that, according to this Doctrine, may much
elp the Theory of Colours, and particularly the
rce both of Sulphurous and Volatile, as likewiſe of
lkalizat and acid ſalts, and in what particulars Co-
urs likely depend not in their cauſation from any
lt at all, may beg his information from that Noble
erſon (in order to whoſe command, for all his inti-
ations to me are ſuch I am now writing) who has
me while ſince honored me with the ſight of his
apers concerning this ſubject, containing many ex-
ellent Experiments made by his Honor for the eluci-
lation of this Doctrine; or otherwiſe, for the pre-
ent, may ſee very good inſtances hereof in Dr. *Willis*
is Treatiſe *De Ferment*, *cap.* 11. And truly, if Taſtes,
olours, Smells, were not eaſily alterable, it would
ot be that we ſhould from the ſeed of the ſame
Plant attain to ſuch change and variety of Flowers
nd Fruits as are mentioned above, nor of Flowers
rom the ſame off-ſet.

But if there be ſuppoſed in the world, and all
everal Bodies, but one Element or material princi-
le, from which by Natures undeſcryed Wiſdom,
n appointing it into ſeveral motions and changes of
ſcituation, and giving different Meaſures and Figu-
ations to its ſmalleſt Particles, there ariſe all the
arieties in the world, then there will be no difficul-
y how the ſame ſort of matter ſhould give ſubſtance
oth to the Stock and Graff, though Plants of diffe-
ent nature, and bearing different Boughs, Leaves,
Fruits, Seeds, each from other; for if from any
matter, any thing may be made without difference,
hen particularly the wildeſt ſtock may afford Ele-
ments fit to nouriſh the Boughs of any Plant, of

how-

77 how gentle and noble nature ſoever.

But laſtly, If all theſe Conſiderations be too troubleſome, I can help a lazy Naturaliſt to an admirable expedient for the reſolving this appearance; let him be content to believe, that when the Sap, gather'd in the Root, comes to the place of conjuncture, it is there forc'd to undergoe a total corruption and lapſe into the Bed of its firſt matter, from whence, by a new generation, there ariſes a new ſap, begot in the Tree by a ſpecifick faculty, which in a Pear graff may be call'd a Pear-ſap-making-power, and ſo in all the reſt: And for the commendation of this laſt way of Reſolution, I muſt expreſs this its excellency, that it is equally applyable to all things in the world, each thing being made (and the cauſe as eaſily believed) by ſome ſuch thing-making power.

Or it might not be amiſs to entitle *Diva Colchodea*, the grand-general form-making-intelligence, to the production of all theſe effects, and in Romantick guiſe, to place her, as it were, in a non-erring chair, ſitting in the very place of conjuncture of Cyon and Stock, and working by ways and arts belonging to her own Trade (and therefore, as her proper myſteries, not to be revealed) to the forming in moſt occult and admirable maner of the appearing effect.

CHAP.

CHAP. VI.

Of the ways for, and Seaſons of ſetting Plants.

ALl Trees and Shrubs of Woody ſubſtance, that have Bodies able to endure the cold, are beſt ſet before the Winter, aſſoon as the Leaves begin to fall: A Quickſet of this ſeaſon, will far outgrow the like planted in the Spring. Artichocks and Aſparagus Roots do exceeding well, being planted at this Seaſon, if ſet in a rich warm mould, and well defended in the enſuing Winter from the violence of the froſts: Artichokes are with us ſet above an Ell diſtance, and thereby in the Winter, a Trench being made between the rows, the Mould is caſt up on ridges for the defence of the Roots; and in the Summer, Cole-flowers, or other Garden-ſtuff is ſet in the diſtances. For Herbs and choice Plants, eſpecially thoſe that are ſet without Roots, it is moſt fit and uſual that they be ſet in the Spring, as Hyſope, Time, Savory, Marjerome, Wall-flowers, Pincks, Gilly-flowers and Carnations, with this Caution; That by how much more tender each Plant is, in regard of cold, the later it requires to be ſet, and in the warmer place.

For all bulbous and tuberous rooted Plants, it is accounted the beſt way for their preſervation and improvement, that they be taken up every year out of the ground, and kept ſome time out of the ground. The Univerſal and Catholick order of all Bulbous

Plants, ſays *Laurembergius*, is, that about St. *James*tyde they be taken out of the ground, and put in a place cold and dry, of a free air, not in the Sun, nor covered with Sand or Earth, or acceſſible to Mice; let them abide ſo a Moneth, or thereabouts, then ſet them again, when they are taken up, cut off the Fibres that grow from under the head: nor need any thus take them up every year (unleſs it be for the tranſplantation of the off-ſets) by which forbearance, the ſtock of Tulips is very much increaſed. *Ferrarius* more particularly forbids the abiding of Anemones in the Earth all the Summer, as being found prejudicial to them by his experience. But Fritellaries, and Peonies, and the Crown Imperial, he will not have removed from their Beds, unleſs into a Cellar, in a pot of Earth.

Nor are all taken at the ſame time, as he ſeems to intimate; for Narciſſes and Crocuſſes are commonly taken up firſt, generally when the flower is gone, the leaf withered, and the Bulb full, it is the beſt ſeaſon to take them up; ſome keep them out of the ground longer, as till Chriſtmaſs, or after; as this year, being in *London*, my beſt Tulips, Anemones and Ranunculus's, were in the Houſe till the beginning of *February*, and yet did well enough: But commonly we re-plant them about Michaelmaſs, or thereabouts: ſome great Floriſts keep them out of the ground no longer than till they grow dry; ſome re-plant them in *June*, ſome in *July* or *Auguſt*; ſome take not up their Ranunculus Roots at all. Thoſe Gardiners, whoſe Beds are apt to be over-flowed or ſoaked with cold water in the Winter, the later they ſet, I believe their Bulbous and Tuberous Roots will prove the better.

The ordinary time to plant Anemones, ſays Mr. Parkinſon, is moſt commonly in *Auguſt*, which vill bear Flowers,ſome peradventure before Winter, ut uſually in *February*, *March*, and *April*, few r none abiding until *May*: But if you will keep ſome oots out of the ground un-planted till *Febr. March* *April*,and plant ſome at one time,and ſome at another, you ſhall have them bear Flowers according to heir planting ; thoſe that are planted in *Febr.* will lower about the middle or end of *May*, and ſo the eſt accordingly,& thus you have thepleaſure of theſe lants out of their ſeaſons, which is not permitted to e enjoyed by any other that I know, Nature not being ſo prone to be furthered by Art in other things, s in this, yet regard is to be had,that in keeping your nemones out of the ground for this purpoſe, you either keep them too dry nor too moiſt,for ſprouting r rotting, and in planting them, you ſet them not n too open a Sunny place, but where they may be omewhat ſhadowed.

N. 2. *Of the ſetting of Woods Fruit-Trees, and Plants uncultivated.*

Concerning Plants that are ordinarily ſet abroad, nd are not cultivated in Gardens or Orchards, few bſervations can be made that are not very vulgar ; tis greatly his intereſt that mindes the thriving of is Trees, that they be ſet that the Roots may run uſt under the Turf, in the ſurface of the Earth, the igher the better, if they are kept moiſt at the root vith wet ſtraw, or the like, and defended from inuries the firſt year. I have ſeen ſoom plants ſo buied in a depth of thick clay or gravel, that they ould not ſhoot for many years a ſprig of a Span long, hereas others ſet orderly in the ſame place did thrive abundantly: And thoſe that think to amend the matter by digging a hole a yard deep, or more, and putting in the Tree with a little good earth, do but cheat themſelves; for the Tree would thrive as well upon a Stone Wall, that is waſhed with rain Water, as in that hole, when once the Root is come to the ſides thereof: This I ſpeak generally and not of ſuch particular Trees as delight in a ſingular Minera of Earth.

And for Orchards, it is a very neceſſary requiſite, that the Roots of Fruit-trees ſtand above the Gravel, Clay, or Rock, if any ſuch be, proviſion for which I have known made two ways, the uſual and moſt common is, to plant with ſuch Standards which have no down-right Roots, which may be gotten in any well ordered Nurſeries, for in ſuch, the Seedling Plants are taken up the ſecond year, and the down-right Roots being cut off ſhort, they are ſet in beds for grafting, and by this means ſhoot their Root rather in compaſs, then directly downwards. The ſecond way is a more unuſual experiment (*viz.*) To ſet the Fruit-Tree on the top of the ground,without anyholedig'd,& to lay a load of ſuch dirt as is found in ſtreets to the root, upon the Turf; yet ſo, that the rain may abide, and not by reaſon of the banck,run from the root of the new ſet fruit-tree.

For Wall-Trees, it is convenient the Roots be ſet at ſuch diſtance from the foundation of the Walls, that they may have room in the Earth for their roots; a foot is a convenient ſpace generally, for then the heads will without difficulty be drawn to the Wall, and the Roots not be prejudiced.

Thoſe Wall-Fruits that are ſet abroad, as Vines, *&c.* being kept ſhort in their Branches, and not ſuffered to climb, become good bearers, eſpecially if they are ſet near the reflection of Gravel-Walks, or upon other Ground kept bare from Weeds.

For the planting of Woods in general, for increaſe of under Wood, Mr. *Blith*'s way is generally approved, to caſt up double Ditches, and plant any ſorts of Wood in the form of a Quick-ſet: Some ſow ſeed on the Bancks in orderly rows, and ſet likewiſe on the top, as well as both ſides of the Bank. The time is, aſſoon as the Leaf is fallen, in any Weather or Seaſon. The Plants in a more ſound ground, are Aſh, Oak, Elm, Sycamore, Maples, Crabs, Thorns; in a more moiſt Ground, as a drained Bog, Poplar, Willow, Sallow, Oſier, which grow by Truncheons. In which watery ſoils, the way of raiſing Ditches is moſt neceſſary: For neither Willow, Sallow, Oſier, nor any other Plant, will grow in a Bog, without ſoundneſs of ground: What Plants grow by cuttings, what by laying for the more ready thickning of Woods, may be ſeen above in the proper Chapter.

There is a ſtory freely defended and frequently, both in diſcourſes Printed and ſpoken, that the chips of Elm, being ſowed, will grow; but that is ſomewhat like *Kirchers* experiments, before-mentioned in the Chapter of cuttings, and not a whit more true; otherwiſe, to ſow thoſe Chips would be a good profitable and frugal way for thickning Woods. The cauſe of the Countrey mans miſtake (for I ſuppoſe not that this error aroſe from Philoſophers) I imagine to be this: At the felling of great Elms many chips muſt needs be ſcattered, and flie round about the Tree, and be covered in Graſs thereabouts; now the next year, after the fall, there ariſe generally great numbers of Suckers from the roots of the old

Tree, which roots, muſt emit all the ſap they gather up into theſe Suckers, the great Trunck being removed. And theſe Suckers are eaſily miſtaken to ariſe from the chips, becauſe they always come upon the felling of Elms where chips are found, and grow at ſuch diſtance as chips are ordinarily ſcattered.

N. 3. *Whether any Vegetables may be ſet ſo as to grow in the Air.*

There is a queſtion now-adays frequently propoſed, Whether there be more Soils then the ordinary Turf or ſurface of the Earth, tempered with ſome water, ſoyl being meant for the ground, in which things may be ſet to grow. I need not ſpeak much upon it, as to Water, which by Experiments related in the Chapter concerning Propagation by cuttings, appears to have a property to elicite Roots, and make them where they were not, and nouriſh the Plants by them after they were made; to which, I muſt adde this circumſtance, not before mentioned, that Periwinckle, and divers others, continued their growth by this nouriſhment alone, from year to year, not dying in the Winter: How long they might have continued, I can't aſſert, for being abſent this Winter, and no fires being kept near, the water in the Glaſſes, was ſo raryfied by the Froſt, that the ſides could not contain it, but were forced aſunder thereby, and ſo the Plants periſhed; whereas otherwiſe, they being ſet in a Room over my Laboratory, I queſtion not, had many of them continued till now.

Some put forward, that the Air might have the faculty of nouriſhing Vegetables aſcribed to it: And no wonder, when *Paracelſus* makes it a

ſufficient

ufficient nouriſhment for men, and brings inſtances
or the proof of his aſſertion. But I finde, That
)nions, Tulips, and all Bulbous Roots, though
hey ſhoot out a green leaf, yet do very much leſſen
n their weight, and it appears, that this growth is
ut the motion of the ſame parts, or ſome few of
hem, to ſettle and gather in another place, and an-
ther order or ſcituation in relation to each other;
or the Onion particularly hath the thicker coverings
f the Bulb very much ſtretched out, and each co-
ering, as it increaſeth in length and breadth, by ri-
ng into a leaf, ſo the thickneſs conſiderable while
: covered the Bulb onely, decreaſeth proportionably
nd is molden into a thinner, and more largely ex-
ended Veſtment.

I have hung up divers Sedums, Orpines, Tithy-
alls, and other ſuch Plants, which I imagined moſt
ikely to grow by the Air onely, and to encreaſe and
e augmented thereby, and found, that by all my
ndeavors, though the Plant grew well, yet they al-
ays loſt weight, and never got the fourth part of a
rain.

Aloes likewiſe, though being hang'd up in the
ir with a cloath dipped in Sallat Oyl, it ſends forth
or many years new leaves, yet it always grows leſs
nd leſs in weight, till at laſt the oldeſt leaves fal-
ing off, and new coming up, it grows to no-
hing.

CHAP. VII.

Of the means for the Improvement and beſt culture of Corn, Graſs, and other Vegetables belonging to Husbandry; and of the ways for removing the ſeveral annoyances that uſually hinder ſuch advantage.

Num. 1. *Of the Annoyances to Land, and the Impediments that uſually diſtemper it, to the diſadvantage of the Husbandman.*

THe Impediments that with us hinder the Husbandmen from making the greateſt advantage of their ground, are either the diſtempers of the ground it ſelf, or ſome evil accidents that occaſionally happen thereto, or to the vegetables growing thereon. The diſtempers are generally cauſed, either by the abounding of water, above all other principles, which cauſes coldneſs, and a Dropſical diſpoſition in the Earth; or by the abounding of a dry Earth or Mineral, and the want of moiſture and ſaltneſs, and that Spirit which ſhould cauſe that

it motion in the inſenſible particles of the Earth,
ich is proper for the exciting the Seeds of all
ngs, and ſo ſtirring the ground, that the ſeveral
rticles may be at liberty to enter the Bodies of
egetables fit for them; the accidents come by
ſting Winds, rapacious Fowls, Vermine, and
eeds, Fearn, Heath, Broom, and other impro-
able Vegetables; of theſe, and the uſual remedies
ainſt them, ſomewhat, and the beſt that at the pre-
nt occurs, I ſhall ſpeak in this Chapter.

2. *Of the remedies proper to cure the exceſſive coldneſs and moiſture in Lands, and the ways of Improvement thereby, in Grounds ſubject to theſe diſtempers, by dreining, Pigeons and Poultry dung, Urine, Soot, Aſhes, Horſe and Sheep dung: Of Ground cold and dry, and how theſe Soyls may be applyable thereto.*

Boggineſs and obſtruction of Springs more or leſs,
generally the cauſe of the chill or coldneſs that
s upon Lands, and breeds the Ruſh and other in-
nmodities, and therefore the foundation of the
re, and improvement thereby, muſt be to remove
s internal cauſe, by laying the ground dry, and
eining the Bog: In the relation of which opera-
n, and many more of this Chapter, I ſhall eaſe
y ſelf, by giving you Mr. *Blith*'s obſervations and
ections thereabouts, who was both a Practicer
nſelf, and queſtionleſs a very faithful and true Re-
rter of his experience.

cold, ruſhy land, ſays he, the moiſture, or cold hun-
y water, is found between the firſt & ſecond ſwarth
the Land; and then oft-times you come immedi-

ately unto a little Gravel, or Stonyneſs, in which this water is, and ſometimes below this, in an hungry Gravel, and many times this Gravel or Stonyneſs lieth lower: But in boggy Land it uſually lieth deeper then in ruſhy; but to the bottom, where the ſpewing Spring lyeth, you muſt goe, and one ſpades depth, or graft beneath, how deep ſoever it be, if you will drain the Land to purpoſe.

And for the matter or Bog-maker, that is moſt eaſily diſcover'd, for ſometimes it lieth within two foot of the top of the ground, and ſometimes, and very uſually within three or four foot, yet ſome lie far deeper, ſix, eight, or nine foot, and all theſe are feazable to be wrought, and the Bog to be diſovered; but until thou come paſt the black Earth, or Turf, which uſually is two or three foot thick, unto another ſort of earth, and ſometimes unto old Wood, and Trees,(I mean the proportion and form thereof, but the nature is turned as ſoft and tender as the Earth it ſelf) which have lain there no man knows how long; and then to a white Earth many times,like Lime,which the Tanner & White-Tawer takes out of their Lime-pits, and then to a Gravel, or Sand where the water lieth, and then one Spades depth clearly under this,which is indeed nothing elſe but a Spring, that would fain burſt forth at ſome certain place, which if it did clearly break out, and ran quick and lively, as other Springs doe, your Bog would die; but being held down by the power and weight of the Earth, that oppoſeth the Spring, which boils and works up into the earth, as it were, blows it up, and filleth the earth with winde, as I may call it, and makes it ſwell and riſe like a Puff-Ball, as ſeldom or never you ſhall finde any Bog, but it lieth higher, and riſing from the adjacent Land to it, ſo that I believe, could you poſſibly light of the very place where the Spring naturally lieth, you need but open that very place to your Quick-Spring, and give it a clear vent, and certainly your Bog would decay; by reaſon whereof, it hath ſo corrupted and ſwoln the earth, as a Dropſie doth Mans Body; for if you obſerve the mould, it is very light and hollow, and three foot ſquare thereof, is not above the weight of one ſollid foot of natural Earth, Clay, or Land, whereby I conceive, that how much ſoever this mould is forced from the natural weight or hardneſs of ſolid Earth or Clay, ſo much it is corrupted, ſwoln, or increaſed and blown up, and ſo much it muſt be taken down, or let forth, before ever it be reduced; I therefore preſcribe this direction: Go to the bottom of the Bog, and there make a Trench in the ſound ground, or elſe in ſome old Ditch, ſo low as you verily conceive your ſelf aſſuredly under the level of the Spring or ſpewing water, and then carry up your Trench into your Bog ſtraight through the middle of it, one foot under that Spring or ſpewing water, upon your level, unleſs it riſe higher; as many times the Water or Spring riſeth, as the Land riſeth, and ſometimes lieth very level unto the head of the Bog, unto which you muſt carry your Drain, or within two or three yards of the very head of it, and then ſtrike another Trench overthwart the very head both ways, from that middle Trench, as far as your Bog goeth, all along to the very end of it, ſtill continuing one foot at leaſt under the ſame, and poſſibly this may work a ſtrange change in the ground of it ſelf, without any more Trenching.

Or thus you may work it ſomewhat a more certain way, but more chargeable, (*viz.*) After you have brought a Trench to the bottom of the Bog, then cut a good ſubſtantial Trench about the Bog, I mean, according to the form of your Bog, whether round, ſquare, or long, or three or four yards within your Boggy ground; for ſo far, I do verily believe, it will drain that which you leave without your Trench, at the depth aforeſaid, that is underneath the Spring-water round; And when you have ſo done, make one work or two juſt overthwart it, upwards and downwards, all under the matter of the Bog, as is aforeſaid, and in one years patience, through Gods bleſſing, expect your deſired Iſſue: And if it be in ſuch a place as will occaſion great danger to your Cattle; then having wrought your works and drains as aforeſaid, all upon ſtraight lines (by all means prevent as many Angles, Crooks and Turnings, as is poſſible, for thoſe will occaſion but ſtoppages of the Water, and filling up of Trenches, and loſs of ground, and much more trouble then otherwiſe.) Then you muſt take good green Faggots, Willow, Alder, Elm, or Thorn, and lay in the bottom of your Works, then take your Turf you took up in the top of your Trench, and plant them thereupon with the Soard downward, and then fill up your works level again, until you come to the bottom or neither end of your work, where your Trench is ſo ſhallow, that it will not endanger your Cattle; or rather take great pibble Stones, or Flint Stones, and ſo fill up the bottom of your Trench, about fifteen Inches high, and take your Turf and Plant it as aforeſaid, being cut very fit for your Trench, that it may ly cloſe as it is laid down; and then having covered it all over with Earth, and made it even as the other ground, wait and expect a wonderful effect, through the bleſſing f God; but if you may, without eminent danger, eave your works open, that is moſt certain of all.

Other and ſecond remedies for all cold Land, are igeons Dung, Dung of Poultry, which abound in eat and volatile ſalt; theſe are onely ſowed by the and, for fear of burning the Corn in the chitting of he Grain: I have obſerved, where theſe Dungs ave been over plentifully laid, that the place bare o Corn at all, when as in other places, where it was oderately ſtrawed, the Crop was exceeding great. The ſame effect there is in Urine and Soot, from the ame principles, (*viz.*) much eager ſpirit and volatile ſalt, and therefore the ſame caution is to be had n their uſe: I have ſeen half the Trees in a Codling-hedge killed, by watering them over-much with Chamber-lye. Horſe-dung, if not rotten, lying thick, will doe the ſame, but rather by an actual heat which it creates by its fermentation, than by the power of ſingle principles, as in the former inſtances, but the exceſs of it is harmful, being laid in ſuch quantities as it may heat, and certainly burns the root of any ordinary Vegetables that grow near it. Sheep-dung, Hog-dung likewiſe, and all Soyl and Litters of Cattle, by reaſon of their Dung, Urine, and heat of their Bodies, lying thereon, have a warmth in them, and are fit for cold Lands on that account; and by reaſon of their moiſture, for dry Lands alſo; for it is to be obſerved, that many Grounds are dry and cold too, in all parts of the North and North-weſt, as *England* lies, and in *England* many of our Wood-lands eſpecially; and ſo all hot and moiſt ſoils are moſt proper for them: Burning and beaking is in many places very ſucceſsfully uſed to this effect; The actual fire heating the ground, and the aſhes of Fern, Brake, Heath, &c. of like nature, yielding a ſalt, very profitable for, and expedient to joyn with the other principles in the ground, to cauſe a fermentation and fruitfulneſs.

'Tis a general rule, that there is nothing in animal Bodies, but will turn to excellent Manure: Their Horns, Bones, Hair, Fleſh, both of Beaſts, Fiſh, and Fowl, are very rich; and thoſe that know the vertue of them, buy at Cities for the purpoſe, rags which are made of Wool, Sheep-trotters, ſtincking Fiſh, or other Offal of Animals, which muſt either be mixed with other Dung, or not laid over thick.

But it is to be obſerved, That where moiſture is rather required then heat, there floating by Land-floods, the dirt and mud of Ponds and High-ways is moſt proper: where warmth and heat, is a greater need; there ſoyl that is made by a mixture of the Offal of Animals, will be more to the purpoſe and advantage of the Husbandman.

Laſtly, 'Tis probable that any thing that has active parts in it, if it be not juſt of the nature of the ground, will raiſe improvement: Heterogeneous things, upon their meeting, ordinarily cauſing that ſtir, which is thought, by moſt Naturaliſts now, to have great influence upon Vegetation.

N. 3. *The ways of Improvement of dry, light, ſandy, gravelly, flinty Lands, by floating, Marl, Chalk, Lime.*

Dryneſſe is generally a great cauſe of barrenneſſe, and is an uſual annoyance in Sandy and gravelly grounds,

rounds, more eſpecially, in regard that they retein ot the rain-water ſo well as clay, or Land of a mixt oil: The proper remedy for this defect, is artificial atering, which tempers the ground moſt properly for the improvement of the growth of the moſt ſeful Plants, Grain and Graſs: For firſt, Water in ts own nature and property is a ſoil, and has an exeeding agreeableneſs with the Bodies of moſt Vegeables, as appears by the experiments of their growth n water onely. And ſecondly, There is a very coniderable accrewment to dry, ſandy, and gravelly arth, by the fatty ſoyl and waſh that is carryed both n Land-floods, and other Water, that having paſſed hrough Cities, Roads, or other places of like naure, are drawn over the ground, for the ſalt, and ther the mixt earth, that was carryed in the Flood, eing apt to reſide to the bottom, is left generally ehinde upon the Land; and the ſalt diluted in the Vater, eaſily enters the Turf, and carries with it ther Particles thither, where, by the heat of the Sun, they being in conjunction with the Sand, Gravel, or ther Bodies Heterogeneous, and unlike to themelves) they cauſe by their mutual fermentation, as s ſuppoſed, or ſome other way, that temper of round which is moſt fit for the growth of all Grain, raſſes, and other Vegetables of general uſe.

For drawing the water over Land, the uſe is, that y the eye or level which is eaſily made to help the ye: Firſt, Diſcovery be made where the water nay be conveighed over the moſt Land: Then Mr. *lith* adviſes, to cut out the Maſter Trench or Waer-courſe, to ſuch a bigneſs, as may contain all the and-flood, or at leaſt, be able to bring it within he Land intended for this improvement: When the water is brought thither, carry it along in a foot broad Trench, or leſſer, all along the level: If the level be too dead, the leſſer ſtream will follow, ſo that a convenient deſcent muſt be minded, to give the water a fair paſſage. If there be diſcovered in this leſſer Trench, any miſtake or failing, it may with eaſe be amended, by going higher to, or lower from the level, and the firſt Trench be ſtopt up again, for this Trench need be no deeper then the thickneſs of the upper Turf: This done, the Water-courſe muſt be cut out, which muſt be large enough to contain the whole Water which is intended for the enrichment of the Land, which largeneſs ought to conſiſt in breadth, and not in deepneſs, for a ſhallow Trench, about a foot deep, is beſt for this work: When the Trench is brought near to the end of the Land, it is to be drawn narrower and narrower.

Further directions the Author gives the Improver, in theſe words.

As ſoon, ſays he, as thou haſt brought the Water upon the Land, and turned it over, or upon it, be ſure thou take it off as ſpeedily as poſſibly, and ſo fail not to cut thy work; ſo as unleſſe thy Land be very ſound, and thy Land-flood very rich, thou muſt take it off the ſooner by a deep draining Trench: Therefore I preſcribe no certain breadth, betwixt floating and draining Trenches; but if the Land be ſounder and dryer, or lieth more deſcending, thou maiſt let it run the broader; and as the Land is moiſt, ſad, ruſhy, or level, let it run the leſſer breadth or compaſs; and for the draining Trench, it muſt be made ſo deep, that it goe to the bottom of the cold, ſpewing, moiſt Water, that feeds the Flag and Ruſh; for the wideneſs of it, uſe thine own liber-

-y, but be ſure to make it ſo wide, as thou maiſt goe to the bottom of it, which muſt be ſo low as any moiſture lieth, which moiſture, uſually lieth under the upper and ſecond ſwarth of the Earth, in ſome Gravel or Sand, or elſe, where ſome greater Stones are mixed with Clay, under which thou muſt goe half one Spades graft deep, at the leaſt: Yea, ſuppoſe the corruption that feeds and nouriſheth the Ruſh or Flag, ſhould be a yard, or four foot deep, to the bottom of it, thou muſt goe, if ever thou wilt drain it to purpoſe, or make the utmoſt advantage of either floating or draining, without which, thy Water cannot have its kindely operation: The truth is, otherwiſe the benefit might happen to be no greater then the Patients, who incurr'd a Dropſie n his cure from a Fever; whereas by this means here is a double benefit, the firſt whereof comes by the commodity of watering, the ſecond, by the dreining Trenches neceſſarily annexed thereunto: And whereas the aforeſaid Author commends watering or floating as an help to boggy, ruſhy, quagmiry Land, I ſuppoſe no benefit, but hurt would ariſe hereby to ſuch Lands, if theſe dreining Trenches id not open the paſſages of the obſtructed Springs riginal cauſes of the Bog or Ruſhineſs, as well as et out the Water newly introduced by the floatng.

The time of the operation for this improvement, muſt be when the Graſs is all off the ground, for lſe the ſoil will ſtain it that comes along with the lood: Often watering is good, but to keep it long in a place, breeds the Ruſh. By this very Husbanry, Mr. *Blith* brings precedents of improvement f Land, from Eighteen pence, to Thirty ſhillings an Acre; and Mr. *Plat*, from One ſhilling to Five pounds.

Another remedy for dry and light ground, ſuch as abound in Sand and Gravel, is Marl, an Earth moſt commonly ſlippery, or greaſie to the touch, ſometimes blew, ſometimes grey, otherwhiles yellow, now and then red, always fryable, ſo that it will ſlack after a ſhower, and not grow afterwards hard or cruſty, as Clay doth, but eaſily reſolves to a duſt or powder: It ſaddens Land naturally, and ſo will turn Rye Land as to make it fit for Wheat, Barly and Peaſe, and therefore muſt not be uſed twice or thrice together, without ſome other more rarifying compoſt to intervene, ſuch as ordinary Dung is; if you lay it down from Tillage, 'tis requiſite that all Marled Land be firſt well dunged.

Chalk alſo I have ſeen uſed with very good ſucceſs in *Hampſhire*, upon the Downs there, which are of ſo dry a nature, that it is grown Proverbial there, that their Ground requires a ſhower every day in the Week, and on the Sunday two; and Mr. *Blith* affirms, that in *Hertfordſhire*, by Chalk, the Improvement is made on Barren, Gravelly, and Flinty Lands.

Mr. *Blith* reports thus of Lime, that it is a ſuitabler Soyl for light ſandy Earth, then for a warm Gravel; 'tis improper for a wet and cold Gravel, but for a cold hungry Clay worſt of all; for, ſays he, Lime being once ſlacked and melted, is of a cold nature, and will ſadden exceedingly, contrary to its nature, in the Stone, for it turns light Land into ſuch a capacity, that it will bear exceeding good Lammas Wheat, or mixed Corn: About twelve or fourteen Quarter of Lime ſerves an Acre, it may as well be over, as under-limed; after Liming, till not long, but return to Paſture.

Num. 4. *Remedies for accidental annoyances and hindrances of Improvement, particularly the ways to deſtroy Fern, Heath, Ant-hills, Moſs, Ruſhes, Reſt-harrow, Broom, or any ſuch Weed or Shrubs that infect the ground: Whether liming of Corn prevents blaſhing, the effects of that and Brine in Improvement: Concerning Moles, and the ways to deſtroy them or drown them; a way of Antipathy, as to this effect, in Animals and Vegetables to the Bodies of their own kinde, when they are in the way of corruption: Mr.* Blith's *way of preſerving Corn from Crows, Rooks,* &c.

When any Land runs to Fearn, Heath, or Ant-hills, Moſſineſs, Ruſhes, coldneſs, or any other Weeds or Shrubs, as Goſs, Broom, Furz, &c. The moſt proper and improving remedy, is, to plow it three or four year, and then lay it down in good heart. In which operation, care muſt be had to plow up the Weeds clean, and burn the Roots of them in heaps, which warms the ground, and to give it convenient dunging every year, for ſo the greater ſhall the improvement be. This Land muſt be caſt into Furlongs, that the Furrows may convey the Water one to another into a general Trench, that it lie not upon the Land.

If the Land be cold and moiſt, lay it the higher in ridges; if hot and dry, ſandy, or the like, let it lie flat, that it may better retain the Rain water.

Be ſure you Plow up the Ruſhes, Brakes, or other annoying Weeds, and for fail let ſome body, with a Spade, follow the Plough, to root up ſuch as are left after the Culter and Plow-ſhare.

Harrow this new broken ground with weighty, ſharp, and long tined Harrows, ſuch as 'tis a Teems work to draw, that uneven places may be torn up, and good ſtore of mould raiſed. Cover your Seed with two or three ſorts of Harrows, each Harrow having tines thicker then the other: ſome put weights upon the Harrows in the firſt, and a Thorn under them in the laſt operation.

After four years Tilth, lay down your Land, and that upon a Crop of Wheat or Rye, not on a Summer Corn, for ſo the Soard will come the ſooner, eſpecially if the Crop be ſowed thin, and as early as may be: If you will double or treble the Improvement, the Husbandry of ſowing Clover-graſs, ſpoken of in the firſt Chapter, will here come in moſt properly. This laſt Plowing, regard that the Ground be laid down ſmooth, yet on ridges if the Land be cold, and unleſs the Land be of exceeding ſtrength, fail not to manure it, by dung, or otherwiſe, this laſt ſeaſon of plowing.

Mr. *Blith* reports, and Mr. *Hartlip* likewiſe, That the natural helps to preſerve Corn from blaſting, is the ſteeping of it in thick fat water, or Lime water, Urine or Brine, or the mixing of Lime or Aſhes, with Corn well wet and moiſt, that ſo it may cloath it ſelf with the fineſt of the Lime or Aſhes, &c. ſo as it may fall cloathed all over to the Earth, and ſo be covered therewith: But I believe he was miſtaken in the applying of the Medicine to the prevention of the right and proper diſeaſe: I have heard ſuch who practiced theſe Medicines, affirm, that they have generally, and with reaſonable good ſucceſs, uſed thoſe remedies to prevent ſmootineſs; but the very laſt year it was obſerved, that where thoſe means were uſed, the blaſt did as much harm, as on the adjoyning Lands, where there were no ſuch Applications made to the Seed. And blaſting being the periſhing of the tender Kernel,by reaſon of a Wind (which from the effect is ſometimes called a red Wind) that too ſharply, and it may be with ſome Venome breathes on it at its firſt beginning; I ſee no reaſon that ſuch infuſions or applications ſhould be any defence, for it comes from an outward violence, and therefore it is moſt uſually ſeen, that not half a Tree onely, but half a bough ſhall be blaſted, while the other half of the ſame, that grows by one and the ſame nouriſhment, remains free, ſound, and well coloured.

There is a procedure mentioned among Mr. *Speeds* notes, for Liming Corn that carries a good probability of advantage with it. Firſt, The Grain was ſteeped in ſtrong Brine of Salt, that would bear an Egge twenty four hours, and then being laid S.S.S. ith Lime that is there, was laid a layer of Corn irſt, and then a layer of Lime, and then again a ayer of Corn, &c. the Lime cleaved to the Wheat, nd was ſowed on Ground not worth Two ſhillings n Acre; the effect was, That it bare as good a crop f Wheat as ever was ſeen in *England*, and afterard three Crops a year of Clover, exceeding good, ne whereof was equal in value to a Crop of Wheat: his being matter of Fact, I believe it, as to imrovement by fertility, becauſe the Brine works vey conſiderably in ſmall proportion, and Lime in this juncture may do well, both to fertility, and defence of the Grain againſt Grubs, and Inſects, and Worms, that abide in the Earth; but ſurely as to blaſting, and Crows and Birds that ſpoil the Corn in the Ear, it has no influence.

Moles by watering are drowned, or driven up to ſo narrow a compaſs, that they may be eaſily taken; I have known them to have been forc'd to leave their holes to run upon the Turf, to ſave their lives from the Water-flood. Mr. *Blith* relates, That one Spring, about *March*, one Mole-catcher and his Boy, in about ten days time, in a ground of ninety Acres, being juſt laid down from Tillage, took about three Buſhels, old and yong; they were not to be numbred, moſt of them being yong and naked, and this he onely did, by caſting up their Neſts, which are always built in a great heap, of double bigneſs to the reſt, moſt eaſily diſcerned, and then the old ones would come to look their yong, which he would ſnap up preſently alſo: At another Seaſon then *March*, which is their time of breeding, ſuch ſucceſs is not to be expected. In other times the beſt way is, if there be any Hedges near, to ſet the Gins or Traps there, for their ordinary roads are in ſuch Hedges, and other places they caſt up, are but of uncertain uſe; as when they intend forage for one time, though it may be that they minde the uſe of that paſſage no more at all. *Bellonius* adviſes to bury Moles in thoſe places, whence you would drive the reſt of that Vermine; and there may be ſomewhat in that remedy: For many living Bodies have a great diſlike to, and antipathy againſt the putrified Bodies of their own kinde: Thus Worms, putrified at the Belly of a Childe outwardly, and the powder given inwardly, are eſteemed as Medicines deſtructive to the Worm in the Belly, though the latter way is by ſome thought to breed more then it kills. Nay, in Vegetables 'tis agreed, That a yong Orchard will not thrive among the Roots of an old rotten Orchard, the reaſon whereof, ſome ſuppoſe to be the antipathy of the yong, againſt the old putrifying Roots; but of this effect, other reaſons may be as probable.

There be ſome other remedies for the ſame annoyances, as, particularly, for the deſtruction of Fearn, the Author named gives this preſcription: In the Spring, when the Fearn begins to grow a little above the Graſs, while it is yong and tender, take a crooked Pole, or piece of Wood about ſix foot long coming in at one end like a Bow, or made like a blunt Sithe; with this ſtrike off all the heads of the Fearn, as low as you can, even to the ground, if poſſible; do this the ſecond or third time, and it proves generally a certain remedy. The reaſon, as I ſuppoſe, is the putrefaction of the Fearn, it being a very moiſt Muſcilaginous Plant, by its own juice, and the moiſture of the Earth, by which the very Roots themſelves come to be corrupted, or elſe the deprivation of all the Buds that germinate from the Root, bycutting off the Sprouts ſo unſeaſonably.

For Ant-hills, to deſtroy the Inſects, and take the hills down, this manner is preſcribed; Divide the upper Turf into five or ſix parts, then take it down with a turfing Spade to the bottom of the Banck, the Turf being cut as thin as can be under the roots of the graſs; then take out the Core of the Bank, that when the Turf is returned to its place, it may lie there lower ſomewhat than the ſurface of the Earth, that the moiſture, which will be a certain deſtruction of the Ants, may a little reſide there: This muſt be done in *November*, *December*, or *January*, that the Roots of the Graſs may the better take to the ground, before hot weather comes in the Spring.

Among Mr. *Speeds* notes, there are theſe Recipts, take red Herrings, and cutting them in pieces, burn the pieces on the Mole-hills; or you may put Garlick or Leeks in the Mouthes of their Hills, and the Moles will leave the ground. I have not tryed theſe ways, and therefore refer the Reader to his own tryal, belief, or doubt.

I had almoſt forgot to mention the change of Seed from grounds of a contrary nature, which by the experience of Husbandmen is found very advantagious, and is thought to prevent ſmootineſs. 'Tis the cuſtom in *Buckinghamſhire*, for thoſe of the Vale to buy their Seed from the Chiltern, on this acconnt; and this experiment is found profitable in Wheat, Barley, Peaſe, and all Field Grains; and not ſo onely, but alſo in Garden Plants.

For the preſerving early or late ſowed Corn, or the ſame when it begins to corn in the Ear, from Crows, Rooks, or Jack-Daws, Mr. *Blith* has invented this Scare-Crow: You muſt, ſays he, kill a Crow or two, and take them into the Field where they haunt, and in the moſt obvious, plain, perſpicuous places, make a great hole of two foot over, and about twenty Inches deep, on the higheſt ground in the Field, which hole muſt be ſtuck round about the edges with the longeſt Feathers; the bottom muſt be covered with the ſhorteſt, and ſome part of the Carkaſs; and that Turf or Earth that is digged out of the hole, being laid round upon a heap, you may ſtick round with

Feathers alſo. One Crows Feathers will dreſs two or three holes, and about ſix or eight holes will ſerve for a Field of ten or twelve Acres. The Feathers will remain freſh a Moneth, unleſs ſtore of Rain or Weather beat them much; and then (if needful) they muſt be renewed.

CHAP. VIII.

Of the Means of Improvement and beſt culture of ſuch Plants or Flowers as are uſually cultivated in Gardens or Orchards, and of the ways uſed for the removing of ſuch annoyances as are commonly incident to them.

Num. 1. *Of the annoyances in general incident to Garden Plants.*

THe Politician ſpeaks it to be a part of as great skill and proweſs to defend a place already gotten, and to improve it to the benefit of the Prince and Inhabitants, as it was at the firſt to arrive at the Conqueſt; this is alike true in the Gardiners Province: It is no eaſie thing with him to raiſe a ſtock of choice Plants, by the ſeveral ways of propagation above mentioned,and as hard to preſerve them, being propagated, from deſtruction by foreign and inteſtine violence. For either the ſharpneſſe of cold, the torridneſs of the Sun, Vermine, or other accident from without,or want of convenient and nouriſhable ſoyl of earth and water, and other Elements proportionable to the plant, will be ſuch internal deficiencies, as to cauſe utter deſtruction: or the haſtineſs and premature, or on the contrary,the tardy and ſlow germination thereof will hinder its excellency; or weeds,or other vegetables, may grow up to its hinderance: and many other impediments there are, which with their ſeveral remedies, as they ſhall ſuggeſt themſelves to my thoughts,I ſhal propoſe in the preſent Chapter, the laſt of this diſcourſe.

N. 2. *Of defences for choice plants from cold.*

One great annoyance to all choice flowers and tender plants, ariſes from the violence of the Winter cold, the defence againſt which you ſhall have as far as I am able to give you, and can think of in the following directions.

Let thoſe Bulbous Roots that are tender, ſuch as the great double white Daffodill of *Conſtantinople*, and other fine Daffodills that come from hot Countries, the *Ornithagolum Arabicum*, purple Montain, Moly, &c. be planted in a large Tub or pot of earth and houſed all the Winter, that ſo they may be defended from the froſts, or elſe, (which is the eaſier way) keep the Roots out of the ground every year from *September* after the leaves and ſtalkes are paſt untill *February*, in ſome dry but not hot or windy

place,

lace; and then plant them in the ground under a outh-wall, which are Mr. *Parkinſons* directions.

Alſoe the late Pine-aple Moly, the Civet Moly of *Mompelier*, the litle hollow white *Aſphodill*, which hough its roots are not glandulous as to be capable of he laſt way, yet they are well preſerved many yeares f by houſing they ſhall be defended from the winter vett and cold.

Roſe-bay Mirtles, the *Indian Gelſimines*, *Jucca Indica*, Orange trees, muſt be houſed in the Winter, o likewiſe, the Cypreſſe, Bay, Piracantha, Mir-le, Pine-tree, Roſe-bay with Spaniſh ſeed, or at he leaſt muſt be cover'd with ſtraw, or Ferne, or ean-hame, or ſuch like thing layd upon croſſe-ſticks o bear it up from the plants till they are two or three eares growth and fit to be removed to their places, *Arbutus*, or the Strawberry tree, Sea-Ragwort, he Pomegranate, and the Indian Figge require the ame care.

Ferrarius commends a Garden houſe with Walls of hick moſſe as good, and ſo without queſtion it is, againſt the Winter cold and Summer heat.

Some defend their Mirtles, Pomegranates, and uch other tender plants, either by houſes made of traw like Bee-hives, or of boards (with inlets for he Sun by caſements, or without them) Litter of Horſe-ſtables being layd in very cold weather about he houſes of defence.

It was a cuſtome in *Italy*, to make ſuch fences for Myrtles (eſpecially when young) as appeares by *Virgills* Verſe.

Dum teneras defendo a frigore Myrtos.

The Roots of the Marvaile of the World, Mr. *Park.* has preſerved by art a Winter, two or three,

(for they'l periſh being let out in a garden, unleſſe it be under a houſe ſide or ſuch dry place) becauſe many times the year not falling out kindely, the plants give no ripe ſeed, and ſo Gardiners would be to ſeek for ſeed to ſow, and Roots to ſet, if this or the like art to keep them were not uſed: Tis thus, Within a while after the Froſts have taken the plants that the leaves wither and fall, dig up the Roots whole, and lay them in a dry place for three or foure dayes, that the ſuperfluous moyſture on the outſide may be withered and dryed; which done, wrap them up ſeverally in two or three browne papers, and lay them by in a box, cheſt, or tub, in ſome convenient place of the houſe all the winter time, where no wind or moiſt air may come unto them, and thus ſhall you have theſe Roots to ſpring afreſh the next yeare, if you plant them in the beginning of *March*, as Mr. *P.* has by his own relation ſufficiently tryed, but ſome have tryed to put them up in a barrell or firkin of ſand and aſhes, which alſo is good if the ſand and aſhes be throughly drye, but if it be any thing moiſt, or if they give again in the Winter, as it is uſuall, they have found the moiſture of the Roots, or of the ſand, or both, to putrifie the Roots.

The ſame Author takes notice that tis one great hurt to Gilly-flowers in the Winter, and to all other herbs, to ſuffer the Snow to lye upon them any time after it is fallen; for it doth ſo chill them, that the Sun doth (though in Winter) ſcorch them up, ſhake therefore off your ſnow gently, not ſuffering it to lye on a day if you can; There is the like inconvenience from Froſts which corrupt the Roots, and cauſe them to rot and breake, for prevention,

take

ke ſtraw, or Litter of an horſe ſtable, and lay ſome ereof about every Root of your Gilly-flowers, eſpeally the beſt ſorts, cloſe unto them upon the ound, being carefull that none lye upon the green aves, or as little as may be: Let it lie till *March* with its winds) is paſt. The generall Remedy r theſe and all flowers, is to be covered with mats, hich are removeable at pleaſure. The choiceſt of all e put in pots and houſed.

um. 3. *Of ſhades requiſite to ſundry Plants, eſpecially when young, for their defence from the Sun and Winde.*

All ſorts of Carnations, Gilly-flowers, and Plants at are tender and yong, eſpecially your *April* and *ay* Seedlings, are to be preſerved and defended om the violent heat of the Sun, and blaſting Vinds: I have ſeen whole Beds of divers ſorts young Seedlings, utterly burnt up at their rſt appearing, by the violence of two or three ot days. Nor do Seedlings onely require this, but l Plants that are not altogether wild, of how woody ubſtance ſoever, that are newly growing, from cut-ngs, or parts without actual Roots.

Shades are commodious, if not abſolutely neceſ-ry to many Plants, even when they are well rooted, s Bays, Lawrel, Savin, and moſt Wood-plants, a ixture of Shade and Sun to Straw-berries; ſo that he Lord *Bacon* wittily adviſes, to ſprinkle a little orrage-ſeed on the Strawberry-bed, for that the traw-berries, under thoſe Leaves, grow far more rge then their fellows.

The beſt ſhades are made by thin well pruned Hedges,

Hedges drawn through the Garden or Nurſery, or by Mats laid over them, and underpropt by a frame of light Poles: But all Seedlings, Flowers, or other Plants that are kept in Pots, are readily removed into convenient ſhade at pleaſure.

Of watering.

Watering with water that has ſtood two or three days in the Sun, is abſolutely neceſſary for all Stringy Roots that I know, at their firſt removals; and at any time, when any Trees or Plants are weak, by reaſon of Drought: All manner of Layers muſt be ſpecially regarded for matter of watering; and thoſe Plants which are to be propagated by the circumpoſition of a Basket of Mould, (to make Dwarf Plants, as they call them) are ſpecially to be watered in dry times: All maner of Gourds, Melons, Cucumbers, even in ordinary weather, require this help, although already firmly rooted.

But there is this difference in Plants, Thoſe that require an hungry ground, ſhall well be content with thin water Sun'd: But Kitchin ground is beſt improved by fat water, wherein Ordure has been waſhed.

And ſome caution is to be had, that by too much water you do not chill or over-glut the ground, often and little is the beſt uſe, and in the Spring and Autumn when Froſts are feared, 'tis better watering in the Morning then at Night; in Summer, the Night I eſteem the better Seaſon.

There is a pretty way of watering choice Plants, by wetting a ſtreiner, and ſo letting one end of it hang over a Veſſel of water, which will draw up the moiſture

oiſture from the Baſon, and let it gently fall down
e ſtreiner to the Root of the Plant.

. 4. *Examples of the beſt Culture of Hops, and ways of ordering them after they are firſt ſet, taken out of Mr.* Blith.

When, ſays he, your Hops are grown two foot gh, binde up with a Ruſh or Graſs, your ſprings to ie Poles, as doth not of it ſelf, winding them as oft bout the Poles as you can, and winde them accord-ig to the courſe of the Sun, but not when the dew upon them; your Ruſhes lying in the Sun will ughen, ſays he, but ſurely better in the ſhade.

And now you muſt begin to make your Hills, and r that purpoſe get a ſtrong Hoe, of a good broad t, and cut or hoe up all the Graſs in the borders be-veen your Hills, and therewith make your Hills, ith a little of your Mould with them, but not with rong Weeds; and the more your Hills are raiſed, e better, the larger, and ſtronger grows your Root, d bigger will be your fruit; and from this time you uſt be painful in your Garden, and be ever and anon, ll the time of gathering, in raiſing your Hills, and earing your Ground from Weeds.

In the firſt year ſuppreſs not one Cyon, but ſuffer hem all to climb up the Poles, for ſhould you bury ie Springs of any of your Roots, it would die, ſo hat the more Poles are required to nouriſh the pring. But after the firſt year, you muſt not ſuffer bove two or three ſtalks to grow up to one Pole, but ull down and bury all the reſt. Yet you may let hem grow four or five foot long, and then chooſe out ie beſt for uſe. As ſoon as your Pole is ſet, you may make a circle how broad your Hill ſhall be, and then hollow it, that it may receive the moiſture, and not long after, proceed to the building of your Hills.

And where you began, or where your Hops are higheſt, there begin again, and pare again, and lay them to your Hops, but lay the out circle higheſt to receive moiſture; be alway paring up, and laying it to the heap, and that with ſome Mould, until the heap comes to be near a yard high, but the firſt year make it not too high; and as you paſs through your Garden, have a forked Wand in your hand to help the Hops that hang not right.

Now theſe Hills muſt the next year be pulled down, and dreſſed again every year. Some, when their Hop binde is eleven or twelve foot high, break off the tops, which is better then they that have their Poles ſo long as the Hop runs: But if that your Hop, by the midſt of *July*, attain not to the top of your Pole, then break off the top of the ſame Hop, for the reſt of the time will nouriſh the branches, which otherwiſe will looſe all, it being no advantage in running up, to the ſtock or increaſe of the Hop.

In *April*, help every Hill with a handful or two of good Earth, when the Hop is wound about the Pole; but in *March* you will finde, unleſs it hath been tilled, all Weeds; but if you have pull'd down your Hills, and laid your ground, as it were, level, it will ſerve to maintain your Hills for ever; but if you have not pulled down your Hills, you ſhould, with your Hoe, as it were, undermine them round, till you come near the Principal Root, and take the upper or yonger Roots in your hand, and diſcerning where the new Roots grow out of the old ſets, of which be careful, but ſpare not the other; but in the firſt year,

un-

ncover no more but the tops of the old ſets, but
ut no Roots before the end of *March*, or beginning
f *April.* The firſt year of dreſſing, you muſt cut
ff all ſuch as grew the year before, within one
nch of the ſame: and every year after, cut them as
loſe to the old Roots; thoſe that grow downward,
re not to be cut, they be thoſe that grow outward,
vhich will incumber your Garden, the difference be-
ween old and new eaſily appears; you will finde your
ld ſets not increaſed in length, but a little in big-
eſs, and in few years, all your ſets will be grown
nto one; and by the colour alſo, the main Root be-
ng red, the other white; but if this be not early
one, then they will not be perceived: And if your
ets be ſmall, and placed in good ground, the Hill
vell maintained, the new Roots will be greater then
he old; if they grow to wilde Hops, the ſtalks will
vax red, pluck them up and plant new in their
laces.

N.4. Mr. Parkinſons *way of ordering the ſeedlings of Tulips grown.*

After the Tulip ſeed is ſowne, the firſt yeares
pringing bringeth leaves little bigger then the ordi-
ary graſſe leaves; The ſecond yeare bigger, and ſo
y degrees, every year bigger then other. The leaves
f the præcoces, while they be young, may be diſcer-
ed from the Media's, by this note which I have ob-
erved, The leaves of them do ſtand above ground,
hewing the ſmall foot-ſtalkes whereby every leafe
oth ſtand; but the leaves of the Media's or Sero-
ines do never wholy appear out of the ground, but

the lower part which is broad abideth under the upper face of the Earth.

Thoſe Tulips now growing to be three yeares old (yet ſome at the ſecond yeare, if the ground and aire be correſpondent) are to be taken up out of the ground (wherein you ſhall find they have run deep) and be new planted after they have been a little dry'd and cleanſed either in the ſame or another ground, again placing them reaſonable neere one to another, according to their greatneſſe, which being planted and covered over with earth again, of about an inch or two thickneſſe, may be left untaken up again two yeares longer, if you will, or elſe removed every yeare after, as you pleaſe, and thus by tranſplanting them in their due ſeaſon (which is ſtill at the end of *July*, or at the beginning of *Auguſt*, or thereabouts) you ſhall according to the ſeed and ſoyle, have ſome come to bearing in the firſt year after their flowering. ſome have had them in the fourth: (but that hath been but few and none of the beſt, or in a rich ground) ſome in the ſixth and ſeventh, and ſome peradventure not untill the eighth or tenth yeare. But remember that as the roots grow greater that in the planting you give them the more roome to be diſtant one from another, or elſe the one will hinder (if not rot) the other.

The ſeed of the Precoces do not thrive and come forward ſo faſt as the Media's or Serotines, nor do give any off-ſets in their running down, as the Media's do, which uſually leave a ſmall Root at the head of the other that is run down every yeare; and beſides are more tender and require more care and attendance then Media's, and therefore they are the more reſpected, This is a generall Rule in all Tulips, that all the hile they beare bud or leafe, they will not beare ower, whether they be ſeedlings, or the off-ſets of lder Roots, or the Roots themſelves,that have heretofore borne flowers; but when they beare a ſecond eafe breaking out of the firſt, it is a certain ſigne hat it will then bear a flower, unleſſe ſome caſualty inder it; as Froſt or Raine, to ſpoile or nip the bud, or other untimely accident befall it.

To ſet or plant the beſt and bearing Tulips ſomewhat deeper then other Roots, I hold it the beſt way; For if the ground be either cold or lye too openly in the cold Northern aire, they will be the better defended therein, and not ſuffer the froſt or cold to peirce them ſo ſoon, for the deep froſts and ſnowes do pinch the Precoces cheifly, if they be too neer the uppe moſt cruſt of the earth, and therefore many with good ſucceſſe cover over their ground before winter with either freſh or old rotten dung, and that will marvellouſly preſerve them. The like courſe you may hold with ſeedlings, to cauſe them to come on the forwarder, ſo that it be after the firſt yeares ſowing, and not till then.

To remove Tulips after they have ſhot forth their Fibres or ſmall ſprings which grow under the greater round Roots (that is from *September* untill they be in flower) is very dangerous, for by removing them when they have taken faſt hold in the ground; you do hinder them in the bearing out their flower, and beſides put them in hazard to periſh, at leaſt to be put back from bearing a while after, as often I have proved by experience, but when they are now riſen to flower, and ſo for any time after, you may ſafely take them up if you will, and remove them danger, if you have any good regard to them unleſſe it be a young bearing Root, which you ſhall in ſo doing much hinder, becauſe it is yet tender by reaſon it beareth now the firſt flower, but all Tulip Roots when their ſtalke and leaves are dry, may moſt ſafely then be taken out of the ground, and be ſo kept (ſo that they lye in a drye, and not in a moiſt place) for ſix moneths without any great harme, yea I have known them that have had them nine moneths out of the ground, and have done reaſonable well, but this you muſt underſtand withall, that they have not beene young but elder Roots, and have beene orderly taken up and preſerved; the dryer you keep a Tulip Root the better, ſo as you let it not lye in the Sun or the Wind, which will pierce and ſpoile it.

Num. 5. *Of annoyance by Plants growing too thick and neer together, and of the remedy thereof, and improvement by pruning Trees, and ſetting them at great diſtances; plucking off the yong Germens of Garden-flowers, to make the reſt more fair; of the ſizing of Turneps, Carrots, Parſneps; of Weeding.*

There is no greater hindrance to the growth and thriving of all Vegetables, than to be ſo crowded together, that their Roots, Branches and Leaves, interfere one with another; and therefore in all Orchard and Garden-plants, whoſe Fruit and Flowers you require fair, and whoſe growth you would have conſiderable, provide that they keep their diſtances: Apple-Trees, Pear-Trees, Plum-Trees, Cherries, and other Plants, are of diverſe ſtatures, both in regard

d of one another, and of their own kinde: Some
pple-Trees grow to much greater growth than
ne other, Pears to a greater growth then Apples,
that it is hard to appoint a certain diſtance for
ees in an Orchard, twenty Foot is ſpace little e-
ugh for Standards of common Apples or Pears;
t a certain rule is, to provide that one Tree ſhade
t another, and therefore let the loweſt Trees, if
u intend to make the moſt of your ground, be ſet
uth, and the higheſt Pear-trees ſtand to the North;
ſhould the higher Trees ſtand South, they would
t their ſhade over the reſt of the Orchard.

This Doctrine of ſetting Trees at ſuch diſtances,
e Husbandman hates, for two reaſons; one is, Be-
uſe it takes too much of his paſture from his Cattle;
d the other is, That by this means he can have but
tle Fruit in his Orchard for many years: There-
e to gratifie his covetouſneſs, I ſhall propoſe him
s practicable way of following and proſecuting my
ention to the utmoſt profit, without putting him
the mentioned grievances. For firſt, I ſhall or-
r that he plant his Orchard full of Trees, within
ree yards diſtance one of another, or ſomewhat
arer, if he pleaſe; theſe ſhall bear him after a year
two, as many apples as a well grown Orchard uſu-
y carries: then let him ſet this ground to a gardiner,
t it may be digged and dunged ſeaſonably, to bring
tchin Plants, for from this Culture the Trees will
ceive great advantage. When the Trees are big
ough, with the defence of a ſtrong ſtake, and ſome
ſhes, to be ſecured from Cattle, let him tranſplant
em into Paſtures of the beſt Soyl, where they may
nd at great diſtances to be ſhelter to Cattle, and
prejudice to the Graſs: One Tree at ſuch diſtance,

ſhall bear as much as ten in ſome Orchards, and thus continue removing, as your Trees grow big enough: I count five or ſix inches about to be a good Size, the bigger they are, the more care muſt be taken in thei removal, that the Root be tranſplanted entire as may be, without much diſ-branching it, or cutting away the ſpurs. And it is convenient, that in the hea of the firſt Summer, wet-Straw be laid upon th ground about the Root.

If you have no paſture to tranſplant into, ſell you Trees to thoſe that have, or ſet your Standards o ſtrong Trees at twenty foot diſtance, and fill up th reſt of the ground with Kentiſh Codlings, Nurſ Gardens, Burts, which are cheap Plants, being pro pagated by Suckers, or with dwarf Trees, made b Circumpoſition, which may be cut down when th other Orchard thickens too much, and in the mea time are very plentiful bearers.

Pruning Trees is uſed likewiſe chiefly t this intent, that the Rays of the Sun may hav paſſage to all parts of the Tree, ſo that 'tis a goo way for the Pruner to look upward from the Nor ſide of the Tree, upon the South and Eaſt, and cut off, or rather make thin, ſuch boughs which findes ſo thick as to obſtruct the Sun: All Boug likewiſe that gall others, and that are actually dea providing always, that the Boughs taken off be little as may be, though the more in number, th ſo the ſap may make up the Bark, and the Tree not decayed by lopping of the greater ſtems: Whi is very perverſly done by moſt Gardiners, who thi that to Prune a Tree, is to cut off the lower Boug bigger or leſs, becauſe they ſee ſmall watery Fr grow on them; whereas if the Sun was let in up

the

hem, their Fruit would be rather more, than leſſe orward, than that which grows in the middle of the ree: I count it general, that the under-Boughs ught never to be cut off, but when you have reſpect o graſs Roots, or other Garden-ſtuff, which grows nder the Trees,or for the ſecurity of the Trees from he browſing of Cattle, ſo that to bare the Trunck of he Tree, for four, five, or ſix yards, as ſome doe, nd nouriſh it to no profit, but to bear and carry up he head to another Region, that Rooks may the better build therein, is a common folly, and ridiculous, f well conſidered.

And for lopping off great Boughs, I may here adde n obſervation touching Elms, which is, That if the op of an Elm of any bigneſs be cut off, the rot ill immediately begin there, and by wet, and other ccidents, run downward, and cauſe that hallowneſs hich is ordinarily ſeen in Trees of this kinde.

Another Rule of pruning, is, That the Gardiner never cut off thoſe Boughs which are ſet and adopted or bearing, which is eaſily known for Roſes particularly: Raſps and Vines always bear upon a freſh ſprout, ſhot forth the ſame Spring, ſo that the more you prune a Roſe, Raſp, or Vine, the more freſh ſprouts of that Springs growth are emitted, and the more ſuch ſprouts, the greater number of Roſes, Raſps and Grapes ſucceed, unleſs ſome particular ccident deſtroys them. Many Fruits bear from the hoots of the antecedent Spring, as the generallity of Apples, Pears, Peaches, Nectarins, Aprecots: Many eem to grow from Wood of longer growth, but in hat a man may be eaſily miſtaken, becauſe a very little, and a Spring of ſcarce diſcernable growth, may be enough to ſerve as a foundation to the pedal of the

Bloſſom or Fruit, which ſtanding on the old Wood, it may be thought that the pedal or ſtalk of the Fruit, ſtands immediately on the Wood, and that there was no Spring interceding. Sometimes the Bloſſoms of the ſame Tree, ſtand both on the Wood of the preſent and antecedent Spring, as it is frequently ſeen in Kentiſh Codlings, Nurſe Gardens, great bearing Cherries. But where ever the Bloſſoms are, and there are many Buds fitted and prepared for bearing, they are diſcerned by the skilful Gardiner, and may be ſeen by any perſon, for thoſe are more full in their ſhutting up than other Buds are, and ſtand not ſo cloſe made to the ſtem of the Branch whereon they grow, and contain more ſmall leaves in their Body then other Buds, being, as I apprehend, the actual rudiment of the enſuing Bloſſom: Such Boughs therefore, whereon plenty of theſe full made Buds, or inchoate Bloſſoms are ſeen, the Gardiner ſpares, if he is wiſe, for the preſent year, and (where he may) prunes off ſuch whereon he ſees no ſuch propenſion to fruitfulneſs.

The fairneſs and largeneſs of Flowers and Fruits are very much augmented, by preventing the running up a multitude of Stalks from the ſame Root: The Gardiner obſerves this preciſely in his Carnations and Gilly-flowers, not ſuffering above one, two, or three Spindles upon ſuch Roots or Stools where he intends a greater fulneſs and largeneſs in the Flowers; and in Anemones the obſervation is, That if any of the Latifolia's bring a ſingle Flower, on the ſame Root with the double, then the cauſe uſually is, the ſtanding of too many Eyes or Germens, and their depending from the ſame Root; and the remedy in like manner, nothing elſe but the taking off thoſe Off-ſets or Suckers, and nd parting them from the principal Root, which oherwiſe is robbed of that matter which might raiſe n each Flower, both fairneſs and multiplicity of eaves.

Shrubs likewiſe that bear either Fruits or Flowers, re to be governed in like manner; Gooſ-berries and Currans degenerate to ſmalneſs, or bear not at all, without this care and proviſion, that the Suckers be aken away: This obſervance is likewiſe abſolutely eceſſary to Damask Roſes, for when they grow up to hick Buſhes they ſcarce bear, whereas being kept to grow in one ſingle great ſtem, being orderly cut, and ot growing in the ſhade, they bear exceedingly.

For Vines, it is a Proverb, make your Vine poor, nd it will make you rich: The fewer principal ſtems are left, the more it bears, and the reaſon is, becauſe the Grapes are borne upon ſhoots of the ſame Spring; and thoſe ſhoots then moſt plentifully ariſe, when the head of the Vine, in proportion to the Roots, is leaſt, as 'tis ſeen in all Trees, which ſhoot ut more immediately after their heads are lopt, than ny other year. Pompions follow the nature of Vines, nd as two or three ſtems is enough for the Vine, ſo two or three runners, and no more, ought to be permitted by him that intends the greateſt fairneſs of his fruit.

It may be proper enough here to ſpeak of Weeding nd Siſing: The latter operation is, the plucking up Roots or Plants that are of uſe in themſelves, but offenſive to others in the ſame Beds, by reaſon of their nearneſs: Thus Turneps are howed up when they ſtand within a foot diſtance each of other; for it is beſt, when at their full growth their leaves touch not one another: Carrots are plucked up, when they are an inch Diameter at the head, for then they are of uſe, or ſooner, if the thickneſs of their ſtanding require it; and this is general for all Roots, Parſneps, Radiſh, Skirrets, that grow by Seed: Some ſow (as I mentioned above) Parſneps, Carrots, Radiſh, and Sallad Herbs in the ſame Bed, firſt Siſing out the Sallad Herbs and Radiſh, then the Carrots as they grow, leaving the Parſneps till Winter, by which means their ground is always full, yet by reaſon of the Siſing in due times, never over-burthened.

The culture of Straw-berries requires ſomewhat like ſizing, (*viz.*) The cutting off, immediately after bearing, the ſpires and ſtrings, which would multiply unto too many Roots and Branches, to have plenty of fair Straw-berries: Nor is this once onely to be done, but as often as they ſpring anew, ſo often are they to be taken off, until the time of the Bloſſoms draws on; I have ſeen ſome that were not over curious to tear off the ſtrings by harrowing up and down their Beds of Straw-berries with an Iron Rake.

Some make a queſtion, Whether Plants of the ſame kinde, by reaſon of a ſuppoſal that they require the ſame parts for nouriſhment; or Weeds and Graſſes, by their too great vicinity, may create more annoyance to their Neighbors, I decide not the queſtion, nor can reconcile the Gardiner to Weeds, whileſt he findes his ſtrongeſt Plants deſtroyed by them: I have ſeen many Trees in a well grown Nurſery, ſpoiled by the Graſs that grew amidſt them; and as I remember, the very Bark of the Trees themſelves was rotted, by a dew caſt upon them from the Graſs: I have likewiſe obſerved, a ſtrongly grown Quickſet of White Thorn, to have been deſtroyed by

Alexan,

Alexanders, which it is at the Readers choice to account as a Weed or cultivated Plant.

The time of pruning generally is the dead of Winter, for ſuch Plants as conſiſt of a Woody ſubſtance: Pompions are deprived of their ſuperfluous creepers, and other Gourds likewiſe, at their firſt time of ſpringing and divarication of their Branches. The ſeaſon of pruning for acceleration of ripeneſs, is when the fruit is made, and begins to grow to ſome bigneſs, as generally they are, about Mid-Summer: Some have a third time of pruning Wall-Fruit, *viz.* at the time when the Fruit is taken off, as they do Roſes likewiſe, when the Flowers are newly gone.

To cut the Branches or Sprigs of a Flower or Tree quite off, cannot properly be called pruning, yet ſometimes it proves an uſeful operation for ſuch Plants as are ſtunted, as they call it, in their growth; Trees that are crooked, or have been bitten with Cattle, or are grown old: Thus Wood-men count it beſt to cut thoſe Stools of under-Wood down to the Root, that it may begin to ſhoot afreſh, that have been much browſed by Cattle; and cut down their hedges to the Roots when they grow old and Moſſy.

Gardiners likewiſe, if by reaſon of a ſharp Winter their Anemone's are pinched with cold, and ſtarved, let them not immediately run to flower, but cut off the firſt Springs to the ground, that in a better Seaſon they may lay a ſtronger Foundation for the bearing of fuller and fairer Flowers.

Num.

N. 6. *Of Piſmires, Earwigs, Canker and rottenneſs in choice Plants, Catterpillars, Moſsineſs, Bark-binding, Burſting of Gilly-flowers.*

There are many other annoyances to Vegetables, and generally ſooner reckoned than remedyed, a word or two I ſhall ſpeak of as many of them as come into my minde: Piſmires, eſpecially thoſe of the black kinde, are exceeding troubleſome in ſome Gardens, for they climb the higheſt Trees, and ſpoil the Fruit, are commonly eſteemed remedileſs. *Bellonius*, who took exceeding pains for improvement by Vegetables, commends the decoction of Broath made of any ſort of Spurge, as very efficacious for this purpoſe: Some draw them to one place, by burying Carryon where they moſt reſort, and then ſcalld them with ſeething liquor.

To divers choice Flowers, but Carnations and Gilly-flowers eſpecially, Ear-wigs are a great annoyance: Mr. *P*'s way of ſetting Beaſts Hoofs among the Flowers, upon ſticks, to take them, is uſed of every Body here, and generally lik'd: Some that ſet their Flowers in Pots, ſet the Pots in Earthen Plates, with double Verges, containing water, or water mingled with ſoot in the outward verge, to drown the Vermine that ſhall attempt the pots, and rain water in the ſecond, which may paſs through the holes of the pots to water the earth therein contained.

The rottenneſs and hollowneſs, that through age & too much moiſture bulbous and tuberous roots, and the beſt Anemones eſpecially, are ſubject too, is thus provided for; the diſeaſe muſt be laid open, and the rottenneſs cut out ſo, that in the root there be no capa-

city

ty left to hold water, which I have often mentioned to be a great Enemy both to them and Tulips. *Ferrarius*, and ſome others, preſcribe Plaiſters of Roſin, Turpentine, and Wax, to apply to the Cicatrices of the wounded Root, which notwithſtanding, I have no great regard for. The ſame Author ſays, that in moiſt Winters Anemones do beſt in pots, in dry, better in beds: With us they are ſeldom potted, but the borders for theſe Plants are uſually laid on pretty high ridges, as Husbandmen lay their Corn Land in deep and moiſt ground, to prevent the miſchiefs that uſually happens by too much wet.

Mr. *Parkinſon* ſays, That if you perceive that your Gilly-flower leaves change any of their Natural freſh colour, and turn yellowiſh, or begin to wither in any part, it is a ſure ſign that the Root is infected with ſome canker or rottenneſs, which will ſoon ſhew it ſelf in all the reſt of its branches, and therefore betime, (elſe 'tis in vain) adviſes that you cover all, or moſt of the Branches, with freſh Earth, or elſe take the faireſt ſlips from it, or according to Art lay it: This way of Mr. *P.* may be applyed unto other Vegetables.

I know no better way to deſtroy Catterpillars, Palmer worms, and other Vermine of that kinde, then by cruſhing their Eggs; as ſoon as they are laid upon the leaf by the Fly, ſome bruſh them off with wet cloathes: 'Tis obſerved, that the little Fly that uſually blows upon the Cabbage, chooſes ſuch Plants as are yongeſt, and eſpecially thoſe that were raiſed in hot beds, or endured leaſt of cold in the Winter preceding.

Moſſineſs of Trees, comes generally either from the barrenneſs or coldneſs of the ground, and there-

of

fore I count it vain to attempt the removal of it; without taking away the cauſe, and making the ground better; which being done, it will be proper enough to rub down the Trees in a wet day with an hair cloath.

Trees likewiſe are ſometimes Bark-bound, eſpecially ſuch, the grain of whoſe Bark runs round the body of the Tree, as in Cherry-trees, and not ſtraight upward, according to the grain of the Tree, as in Apples, Pears, *&c.*

For the Bark is not generally, as I ſuppoſe, nouriſhed by appoſition of a new rinde to it, as the ſubſtance of the Tree is; but by interpoſition of particles, amidſt the particles of the rinde already made, which if it be ſo hard as not to admit other Particles for its enlargement, there can be no new addition of a new coat of wood, which ought to accrue every year to the Tree, for there will be no ſpace wherein the ſap may aſcend, which is to be hardned into ſuch new wood, unleſs by renting the whole coat of Bark, which ſometimes happens.

The remedy for this diſeaſe, both in Cherry-trees, and other Trees, thoſe chiefly whoſe Barks are hardned and grown cruſty by long ſtanding in ſhadowy places or barren ground, is, that the year after their removal, or upon addition of better ſoil in ſtreight grained Barks; and without either removal or addition of ſoil in Cherry-trees, and other croſs grained Barks, or in any Trees whoſe Barks rend of their own accord, the Barks be ſlit from the top of the Tree to the bottom of the ſtock, and that according to the bigneſs of the Tree, in one, two, or three places: This is a Chyrurgical remedy that never fails, and is eaſily performed.

Carnations and Gilly-flowers, happen to be often deformed, eſpecially thoſe which are of the largeſt ſorts, by burſting the Calyx, Cellar, or Caſe wherein they are ſet, and the uſual remedy is, to inlarge the five inciſions proportionably, by cutting them deeper with a Knife; or to ſteep ordinary Beans in Water, and then ſlipping off the outward coat of the Bean, to put it (the end being taken off) upon the head of the Carnation, which will keep the five lips together, and preſerve the Flowers from breaking; nor will theſe Hoops, made of the coats of Beans, ſhrink with the heat of the Sun, as thoſe made of the rind of Willow, ſlipped off for the ſame purpoſe, uſually doe: One Bean is long enough to make two hoops, for they need not be above a quarter of an inch in breadth.

Num. 7. *Of improvement and melioration of divers Sallad Herbs, by blanching or whiting, from the French Gardiner, and Mr.* P's *Obſervations.*

The Lettuce-Royal, being, upon removal, ſet at a foot or more diſtance, when you perceive that the Plants have covered all the ground, then in ſome fair day, and when the morning dew is vaniſht, you ſhall tie them in two or three ſeveral places one above another, which you may do with any long ſtraw, or raw hemp, and this at ſeveral times, (*viz.*) Not promiſcuouſly, as they ſtand, but chooſing the faireſt Plants firſt, to give room and air to the more feeble, and by this means they will laſt you the longer: The firſt being blanched, and ready before the other are fit to binde.

If you would blanch them with more expedition, you may cover every Plant with a ſmall earthen pot, faſhion'd like a Goldſmiths Crucible; and then lay ſome hot ſoyl upon them, and they will quickly become white.

Concerning Succories, Thus,

There are ſeveral kindes of Garden Succories, different in leaf and bigneſs, but reſembling in taſte, and which are to be ordered alike.

Sow it in the Spring upon the Borders, and when it has ſix leaves, replant it in rich ground, about eighteen inches diſtance, paring them at the tops: when they are grown ſo large, as to cover the ground, tye them up, as I inſtructed you before, where I treated of the Roman Lettuce; not to binde them up by handfuls, as they grow promiſcuouſly, but the ſtrongeſt and forwardeſt firſt, letting the other fortifie.

There is yet another faſhion of blanching it: In the great heats, when inſtead of heading, you perceive it would run to Seed, hollow the Earth at the one end of the Plant, and couch it down without violating any of the leaves, and ſo cover it, leaving out onely the tops and extremity of the leaves, and thus it will become white in a little time, and be hindred from running to Seed.

Thoſe who are very curious, binde the leaves gently, before they interre them, to keep out the Grit from entring between them, which is very troubleſome to waſh out, when you would dreſs it.

Remember to couch them all at one ſide, one upon another, as they grew being planted, beginning with that which is neareſt the end of the Bed, and continuing to lay them, the ſecond upon the firſt, and the third upon the ſecond, till you have finiſhed all the Ranges.

I finde likewiſe two other manners of blanching them for the Winter; the firſt is, at the firſt Froſts, that you tie them after the ordinary way, and then at the end of eight or ten days, plucking them up, couch them in the Bed where you raiſ'd them from Seeds, making a ſmall Trench croſs the Bed the height of your Plant, which will be about eight Inches, beginning at one end. In this you ſhall range your Plants ſide by ſide, ſo as they may gently touch, and a little ſhelving; this done, cover them with ſmall rotten dung of the ſame bed: Then make another furrow for a ſecond range, in which order, lay your plants as before, continuing this order till you have finiſh'd: And laſt of all, cover the whole Bed four Fingers thick, with hot ſoyl freſh drawn out of the Stable, and in a ſhort time they will be blanched. If you will afterwards cover the bed with ſome Mats placed aſlant, like the ridge of a Houſe, to preſerve them from the Rain, they will laſt a very long time without rotting: When you would have any of them for uſe, begin at the laſt which you buried, and taking them as they come, draw them out of the range, and break off what you ſhall finde rotten upon the place, or that which has contracted any blackneſs from the dung, before you put it into your Baſket for the Kitchen.

A ſecond manner of preſerving it, is, to interre it, as before, in furrows of Sand in the Cellar, placing the Root upmoſt, leaſt the Sand run in between the leaves, and you finde it in the diſh when they ſerve it. You need not here beſtow any dung upon them, it is ſufficient that the Sand cover the Plant four fingers high; and when you take it out for uſe, before you dreſs it, ſhake it well, the Root upmoſt, that all the Sand may fall out from the Leaves. Take them likewiſe as they happen to lie in the Ranges.

His directions for blanching Endive, are, that you cover it onely with reaſonable warm dung, and drawing it out at the firſt appearance of Froſt, that you keep it under Sand in your Cellar, as you do other Roots, but firſt it muſt be almoſt white of it ſelf.

The whiting of Endive, Mr. *Parkinſon* commends, when done in another manner: After, ſays he, that they are grown to ſome reaſonable greatneſs, but in any caſe before they ſhoot out a ſtalk in the midſt for Seed, take them up, and the Roots being cut away, lay them to wither for three or four hours, and then bury them in the Sand, ſo as none of them may lie one upon another, or if you can, touch one another, which by this means will change whitiſh, and thereby become very tender, and is a Sallet for Autumn and Winter. Fennel is whited by ſome in the ſame manner, for the ſame uſe.

To procure the Chard of the Artichocks (which is that which groweth from the Roots of old Plants) you ſhall make uſe of the old Stems which you do not account of. For it will be fit to renew your whole Plantation of the Artichocks every five years, becauſe the Plant impoveriſhes the Earth, and produces but ſmall fruit.

The firſt Fruits gathered, you ſhall pare the Plant within half a foot of the ground, and cut off the ſtem as low as you can poſſible; and thus you will have luſty ſlips, which grown about a yard high, you ſhall binde up with a wreath of long Straw, but not too cloſe, and then environ them with dung to blanch them.

Thus you may leave them till the great Froſts, before you gather them, and then reſerve them for your uſe in ſome Cellar, or other place leſs cold.

N. *Of Acceleration and Retardation of Plants, in reſpect to their Germination and maturity.*

Acceleration of Plants in their Germination and Maturity, is ranked, by the Lord *Verulam*, among the *Magnalia Naturæ*, and is an operation that all Artiſts can do ſomething in: though I know not any that arrive to the performance of thoſe grand propoſals of ſome Writers, as that of raiſing Sallads within an hour or two, whiles a Joynt of Mutton is roſting: The late King of *France*, has been reported to have known a ſecret proceſs that would produce this effect, and to have eſteemed it at a high rate: Cichory was the Seed, as I was informed by Monſieur *Giſſonius*, which he was wont to raiſe ſo ſoon into his moſt fam'd Sallad.

I have tryed divers of the Experiments propoſed for procuring thoſe wonderful ſpeedy Germinations, and that by long infuſions in Milk, ſtrong Muck-water, and ſometimes have added unquenched Lime unto the infuſions, according to the Experiments ſet down by a late Writer, who aſſerts, that by theſe uſages, Beans, Peaſe and Parſly Seed would grow up in few hours, and can onely give the Reader this fruit of my pains, that without any further tryal, he may from my experience be aſcertained, that the advantage in acceleration is exceeding inconſiderable by any of theſe means. It was, by my tryal, found much leſs could have been by any infuſion, for none of the Seeds (of which I tryed many ſorts) came up the firſt three or four days; and except Radiſh, none came up in a fortnights time, though they were ſown in *Auguſt*, and watered.

I have likewiſe tryed the Experiment of Aſhes of Moſs: Firſt, burning a great quantity of Moſs to aſhes, and then taking ſome of the richeſt Garden mould I could procure from a rotten hot Bed, and mixing it with the aſhes, I moiſtned it with exceeding good Muck-water ſeveral times, and let it as often dry in the Sun; this I did in glazed pans, that the Salt might not be waſhed from the Earth; then I ſowed Seeds, ſome unſteeped, ſome ſteeped, and in the beginning of *September* ſet the Pans upon the Leads of an Houſe: But in effect, the Sallad ſprang not up that day, nor many days after.

The next day I ſet into ſome of the ſame kinde of Soyl, made up of Moſs-aſhes and dung, watered as above, divers Seeds ſteeped in Spirit of Urine alone, Spirit of Urine with water mixed, Spirit of Urine mixt with phlegm of Elder-berries, all withont ſucceſs, though I ſet them in a Pan of Earth over a gentle fire, to ſpeed the Germination: Formerly I have ſeen Spirit of Nitre tryed, but to no purpoſe; ſome ſpeak of working theſe ſuddain Germinations by ſomewhat made of Salt, Spirit, and Oyl, chymically united into one Body, which when they ſhall diſcover unto us, or otherwiſe make us poſſeſſors of, we ſhall have a better opinion of the related experiment.

As to ordinary Acceleration, hot Beds are the moſt general and catholick help, and certainly forward Germination much: For Cabbage-ſeed ſown in the Spring on a hot Bed, I have ſeen, to bring Plants that have in their growth and bigneſs overtaken ſuch that were re-planted before the antecedent Winter, and ſo were in the ground, at the leaſt, half a year before them; and that in the ſame ſort of Soyl. It is certainly true, that the Germination will be the more quick, the hotter the weather is; and the larger the bed of Dung is made, and the more it is helped by the reflection of Brick Walls, or other like advantages: The manner to make theſe hot Beds, is mentioned in the firſt Chapter, and their uſe there deſcribed.

Mr. *Speed*, *Cap.* 14. *Of Musk-melons*, Gives us from the teſtimony of two Noble Men, this advertiſement: The way, ſays he, to have as good Musk-melons as any are in *Italy*, without the unwholeſom uſe of the Muck-Beds here in *London*, is confirmed by the Earl of *Dorſet*. Plant them under a Wall, Pale, or Hedge, on the Sunny ſide, with very good Mould purpoſely prepared, and underneath the mould lay a quantity of freſh Barly-ſtraw, and by this eaſie means, uſing the ſeaſonable covertures and neceſſary furtherance, you may attain to your uttermoſt deſire, without any further trouble. But if you do diſcern the Straw to make the Earth too hot, thruſt in a Stake through the mould to the ſtraw, that the vapor and heat may evaporate and paſs forth.

For Acceleration of maturity in all Wall-fruits, the practice of Midſummer pruning is every where almoſt obſerved, which is, the cutting off all parts of the ſhoots that are grown out far beyond the Fruit, and do otherwiſe take away both the ſap that might advantage the Fruit, and the benefit of the Sun likewiſe: This operation in Vines is called gelding, and is uſually transferred to Pompions, Musk-melons, and

Cucumbers, and like Fruits) to accelerate their ripeneſs: The Joynt beyond the laſt Cluſter or Gourd, is the place where the Creepers or Shoots are to be nipt off in Vines or Gourds: In other Wall-Fruit the Gardiner clips them at a convenient diſtance from the Wall, ſo as not to take away all the ſhade from the Fruit, which in ſome proportion is neceſſary that the Fruit be not dryed up, and burnt upon the Tree by the Torrid heat of the Mid-ſummer Sun, in ſuch places where his rays are reflected from a Wall or Floor, or both.

'Tis alſo obſerved that in Wall-Fruit, or any other that requires a reflected heat, in order to the ripening of the Fruit; the lower the Boughs are ſpread, the ſooner the Fruit ripens on a Wall: And in Standards, the lower and nearer the Earth any Plant is kept, the better ſhall it ripen, by reaſon of the reflection made from the ſurface of the Earth; which if be bare from Weeds, is equal to the reflection from ſome Walls. In *France*, Vines have no other reflection but this, being tyed to ſtakes, and not ſuffered to grow above a yard high; and in many places of *England* this onely advantage, without Walls, brings Grapes to that maturity which is ordinary in our Iſland.

The twiſting of the ſtalks, whereby the Bunches of Grapes are joyned to the body of the Vine, done at ſuch time when the Grape is come to its full bigneſs, is practiced by ſome for the accelerating maturity; and it may be, that by this twiſting, the Channels, that might otherwiſe carry more crude Sap into the Grape, being broken, the heat of the Sun may more ſpeedily reduce that which is already poſſeſſed by the Grape into ſweetneſs, then if ſowre and undigeſted Juice were ſtill ſupplyed from the Vine.

Retardation, or hindring Plants from running to Seed, is likewiſe of uſe for the preſervation of the Root and Leaf; for there are many Plants, whoſe laſt endeavor being to bear Seed, preſently die in all parts of them aſſoon as the Seed is perfected.

Of this kinde are your beſt Carnations and Gilly-flowers, the hope of whoſe continuation is onely by thoſe Slips that are not like to bring Seed the preſent year; to this kinde alſo belong divers Herbs, ſuch as are Parſely, Scurvy-graſs, &c. The Spindles there-fore of all ſuch are timely to be cut off, the younger the better, in choice Plants, for fear of killing the Root; and hereby plenty of Branches and Off-ſets, or ſide-Plants, will ariſe from the old Stem, Stool or Root. Nay, 'tis obſerved by our Gardeners, as like wiſe by *Ferrarius*, in his Chapter of the culture of Tulips, That if thoſe Flowers are ſuffered to grow to Seed, the Bulb thereby is certainly much emaciated, nd ſometimes utterly periſheth; and therefore, on ll hands it is counted good to gather Tulips as ſoon as may be.

Some of the ways of Retardation are generally known, as particularly the experiment of plucking off Roſe-Buds as often as they ſpring, until the time you ntend they ſhall proceed to flower; or the making he Branches of the Roſe Tree bare of Shoots once or wice in the Spring, for this purpoſe, are not unfre-quently practiced. And I have been informed by a Perſon of Credit, that at *Briſtol* he ſaw Raſpes ſold or four pence the quart at *Michaelmas*, which were hus retarded, by ſetting the Plants late in moiſt ground the ſame year: All which ways, I ſuppoſe, may well be transferred to other Plants of like nature, nd this laſt way is not ſo common. I have before mentioned its uſe for the retardation of the Flowers of Anemonies.

There is ſome uſe of retardation to all ſuch Plants which ſo prematurely bloſſom, that they be ſubject to blaſting by Spring-Froſts; I know nothing uſed to prevent this annoyance, but the opening of the Root, and ſuffering the Snow, and Snow-water, to lie thereon and chil the ground; but of the benefit or danger of this remedy, I have no experience.

Num. 8. *Of melioration by Richneſs, or other convenient Minera in the Soyl, for the feeding and better nouriſhment of ſeveral Plants: Of artificial Bogs, and the change of Seed, as a means to bring fair Flowers: Of Exoſſation of Fruit, or making it grow without Stones.*

The Lord *Verulam* reckons up the making of rich compoſts for the Earth, among the *Magnalia Naturæ*, and moſt advantagious projects for the uſe of Man; which richneſs, if the modern Hypotheſis of Chymiſts be right, conſiſts in good proportions of ſalt Spirit, and Oyl; which are principles generally deficient in barren places: Dry Earth, and cold crude water, or theſe two mixt together, every where abounding: I ſay, good proportions, becauſe it is moſt certain, that no Vegetable will grow in too great abundance of Salt or Spirit, or other violently hot and corroſive matter: Sut and Pidgeons-dung abound much with volatile Salt; and I have this year, upon a cold moiſt Clay, ſeen excellent advantage to the Graſs thereby, it being onely ſtrewed thin on the Graſs before the Spring, but of the two, the Sut was beſt: upon a dry Sand I ſhould not have expected the

like

ike improvement by its mixture, and in theſe comoſts themſelves by reaſon of abundance of ſalt, withut due proportions of other principles mixt, nothing vill grow, for there is no fermentation without mixure of contrary parts or Elements; and all dunging s in order to fermentation: Hence *Columella* comnends Pidgeon-dung, becauſe, ſays he, *Præ cæteris erram facit fermentare*, the earth generally abounding n its own nature, with coldneſs & moiſture, ſo that the ichneſs in Salt or Spirit, tempers a Soyl well, which s deficient in theſe principles, for thoſe Vegetables hat require in the ground ſo ſprightful a Fermentatin. For divers ſtates of ground, and various Fermenations are required to different Plants, nor can any ne Soyl indifferently and equally agree with them all ccording to that of *Virgil.*

Nec vero terræ ferre omnes omnia poſſunt,
Fluminibus ſalices, craſſiſq; paludibus alni
Naſcuntur; ſteriles ſaxoſis montibus orni,
Littora myrtetis lætiſſima: denique apertos
Bacchus amat colles, Aquilonem & frigora taxi.
Aſpice & extremis domitum, cultoribus orbem
Eoaſq; domos Arabum, pictoſq; Gelonos
Diviſæ arboribus patriæ: ſola India nigrum
Fert ebenum, ſolis eſt thurea virga ſabæis, &c.

All Grounds can't all things bear: The Alder Tree
Grows in thick Fens; with Sallows Brooks agree.
Aſh craggy Mountains: Shores ſweet Myrtle fills,
And laſtly, *Bacchus* loves the Sunny Hills:
The Yew beſt proſpers in the North, and cold,
The conquered Worlds remoteſt Swains behold:
See the Eaſtern *Arabs*, the *Geloni*, theſe
Countries are all diſtinguiſht by their Trees:

The blackeſt Ebony from *India* comes,
And from *Sabæa* Aromatick Gums, *&c.*

Saffron, Tulips, Anemones, and many other Plants which be propagated by bulbous or tuberous off-ſets, require for their melioration, to be planted in a light Soyl, that receives ſome mixture of fatty earth with it: ſome commend Cow-dung rotted, above all other ſoil, to be mixt with other ſandy earth for theſe Plants.

Boggy Plants require, even when they be planted into Gardens, either a natural or artificial Bog, or to be placed near ſome water, by which there is great improvement to all ſorts of Flags, and particularly, as I have obſerv'd to *Calamus Aromaticus.*

The artificial Bog is made by digging a hole in any ſtiffe Clay, and filling it with Earth taken from a Bog; or in want of ſuch clay ground, there may be ſtiffe Clay likewiſe brought in, and laid to line the hole or pit in the bottom or floor, and the ſides likewiſe, ſo thick, that the moiſture may not be able to get through: Of this ſort, in our Phyſick Garden here in *Oxford*, we have one artificially made by Mr. *Bobart*, for the preſervation of Boggy Plants, where being ſometimes watered, they thrive as well as in their natural places.

However 'tis true, that there is variety of uſuage for Plants of different nature, yet for the generality of Plants, they are beſt improved by a fat, rich, deep, moiſt, and feeding Soil; and it is highly his intereſt that intends a flouriſhing Orchard, or Kitchin-garden, to improve his ground to the height; divers Flowers reap benefit by the ſame advantage; as particularly, Carnations and Auricula's; though for theſe, and ſome other Plants, the rotten Earth that is uſually found in the Bodies of hollow Willow-Trees, is thought to be a ſoyl more ſpecifically proper, eſpecially when mixt with other rich Soyl throughly rotten.

That wilde Plants may be meliorated by tranſplantation into better Soyl, and by being ſet at greater diſtances, is no more then what was before noted, and agrees with that of *Virgil*, *Georg.* 2.

Sponte ſuâ quæ ſe tollunt in luminis auras
Infœcunda quidem, ſed læta & fortia ſurgunt
Quippe ſolo natura ſubeſt; tamen hæc quoq; ſi quis
Inſerat, aut ſcrobibus mandet mutata ſubactis
Exuerint, Sylveſtrem animum, cultuque frequenti,
In quaſcunq; voces artes, haud tarda ſequentur.
Nec non & ſterilis quæ ſtirpibus exit ab imis
Hoc faciet vacuos ſi ſit digeſta per agros.
Nunc altæ frondes & Rami Matris opacant:
Creſcentiq; adimunt fœtus, uruntque ferentem.

Plants that advance themſelves t'etherial Air
Unfruitful be, but ſtrong they prove, and fair;
Becauſe they draw their nature from the Soyl:
But theſe, if any, graft; or ſhall with toil
Tranſplant, and then in cultur'd Furrows ſet
Their wilder diſpoſition they forget:
By frequent culture, they not ſlowly will
Anſwer thy labour, and obey thy skill.
So they that ſpring from Roots, like profit yeild,
If you tranſplant them to the open Field, (ſhade,
Which now the Boughs of th'Mother-plant do
And th'Off-ſets ſtop her growth, and make her fade.

The Seed of wilde Cichory that grows every where in the Fields, being ſow'd in rich Garden-ſoyl, is ſo improved, that we eſteem it ordinarily another Plant, and give it the name of Garden-Cichory, though indeed they are the ſame. But beſides the goodneſs of the ground, and greatneſs of the diſtances, there may be ſome advantage to Field-Plants by changing the Seed, by which action the fermentation is ſuppoſed to be augmented in the Ground: Now theſe changes are either from one kinde to another, as from Wheat and Barly, to Beans and Peaſe, which is the uſual Husbandry of common Fields, or in the ſame Seed: Of the former way, *Virgil* gives this Precept.

——ibi flava ſeres mutato ſidere farra,
Unde prius lætum ſiliqua quaſſante legumen,
Aut tenues fœtus Viciæ, triſtiſque Lupini
Suſtuleris fragiles calamos, ſylvamque ſonantem.
Georg. 1. By Mr. *Ogilby* thus rendred.
—— There changing Seaſons thou ſhalt Barly ſow
Where pleaſant Pulſe with dangling Cods did grow,
Where brittle ſtalks of bitter Lupines ſtood,
Or ſlender Vetches in a murmuring Wood.

Of changing the Seed of the ſame kinde, beſides Field Corn, which is generally changed every third Seaſon at the fartheſt, examples may be had in Carnations and Gilly-flowers, the Seed of which, being taken from the beſt Flowers, are much meliorated by alternation and change of Ground; and it is like this Experiment may hold in the ſeeds of other Flowers.

Another Experiment, is the exoſſation of Fruit, or cauſing it to grow without ſtones or core, for which effect, the grafting of the upper end of the Cyon downwards, hath been aſſerted to be a certain way: That the Cyon ſo grafted will grow, I have experience; but whether in time they will produce the forementioned effect, I greatly doubt: And if they ſhould, I much miſtruſt their expectations would not be anſwered, that intended melioration thereby: For the Fruit, certainly by the loſs of the natural Seed, would be very much diſpirited, and looſe the generoſity and nobleneſs of its nature, as Animals do, and as Vegetables ſometimes; as particularly I have obſerved in Barberries, for I have ſeen a Tree that bare every year on moſt Bunches two ſorts of Barberries, the one full, and of a deep red; the other of a pale colour, and thin ſubſtance, and inquiring into the cauſe, I found the former to have Stones in them, and the latter deſtitute, which were, as I ſuppoſed, thereby emaſculated.

N. 9. *The concluſion of the Treatiſe, with one or two choice obſervations of the wiſe and good Providence of God, which may be ſeen in the admirable make of Vegetables, and fitneſs to their ends, which are not generally taken notice of, but are, with many more, overſeen by men buſie in the affairs of the world.*

It was the ſin of the Heathen that they did not riſe in their mindes from the contemplation of the beauty of the creatures, to conſider how ſuch lineaments could be made, and to glorifie thereby the wiſdome of the Maker. The particulars are infinite, that ordinarily to a man exerciſed in things and thoughts, ſuggeſt themſelves to avouch Providence, and confute the vanity of the old Epicureans in the ſimpleſt of their Tenets concerning the framing of this world, of things by a caſuall concurrence of ſmall motes intricated in their motion, by meer chance into ſuch beautifull bodies.

It is no unuſuall Theme to treat of the admirable handſomeneſſe and beauty in the compoſure of divers Vegetables, and to ſhew how Nature doth γεωμετρεῖν in them, and characterize out ſuch variety of elegant figures, that every plant ſhall ſeem to have more of Mathematicall art,than the Knot wherein it is ſet:And tis generally noted,that Gods Providence is exceeding good in appointing Nature ,and making it her end to continue ſome individualls of everySpecies for the preſervation of the kinde.That likewiſe the ſame Providence has approved to its ſelfe a moſt excellent wiſdom in the choiſe of moſt certain meanes, for the attainment of this end,it has been mine , and may be an eaſie conſideration to any other.

For what other end , thought I , are there ſo many coates , and ſuch cotton veſtment to ſeeds, but to defend their tenderneſſe ? Why ſuch hard ſtones to other , but to hinder their premature ſpringing , whereby the coldneſſe of Winter would kill (as in Aprecots , Peaches , Nectarines, &c.) their tender ſeedlings? Why is the ground in Woods covered with Moſſe , but that Nature intended it as a preſervation to ſeeds fallen upon the Turfe in the violence of Winter Froſts? Why has Nature beſet ſhrubs with prickles , but to defend the tender buds in which the hope of future growth is repoſed from the browſing of cattell in the Winter? and that this was the end of Providence in it may be conjectured from hence,becauſe thoſe ſhrubs which are not all over thorny, have a guard of Thornes directly upon the bud & not elſe where, as if ſingularly intended for its ſecurity. So tis ſeen in the Gooſeberry, Hawthorne, Barbery, Locuſt, all Roſes wild and cultivated that are not all over thorny, ſo that the thorns are not uſeleſſe excreſcencies as ſome have ſuppoſed, but as profitable as boughs or leaves.

Why have thoſe plants that bear no ſeed with us, as Poplar and Willow, in every bough of any bigneſſe, a propenſity of ſending forth Roots, by the occaſion of which, each branch is made an entire tree or plant? or if that faculty be wanting, why then is there ſo great diſpoſition and forwardneſſe to propagate themſelves by off-ſets, as in the Elm, Poplars &c, And where there can be no off-ſets, as in Muſhroomes, wherefore elſe has Nature made the plants propagable by the ſmalleſt of their ſhreds and inconſiderable parts? Why elſe is the Indian Fig, that hath no ſtalk, propagable by its leaf alone?

Why have plants ſuch an eagerneſſe to flower and ſeed, and ſuch an impatience of being diſapointed? if you pull off the bud of the Roſe it will ſpring againe, and not only the Roſe, but moſt other fruits and flowers have the ſame deſire to produce their ſeeds, and have given occaſion to Artiſts to make hence Rules of Retardation.

Why do the Seeds ſtick cloſe to the Pedall by which they are joyned to the ſtock untill they are mature and fit for propagation, and then fall off in the moſt fit ſeaſon for due preparation to future growth?

Why do thoſe plants that uſually die every yeare, yet if they are diſappointed of running to ſeed, continue to ſurvive many years, even ſo long till they are permitted to run up to leave ſeed behind them? But that they are appointed by the univerſall Law of Nature, not to deſert their order, till they have produced others after their own kind,

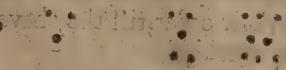
Laſtly,

Earth, Why are many Seeds at their firſt ripening ſo exactly fledged with wings, but that by the wind, they may be carried to ſuch places as may be fit wombs to receive and feed them, untill they attaine from the being of ſeeds the meaſure and ſtature of perfect plants.

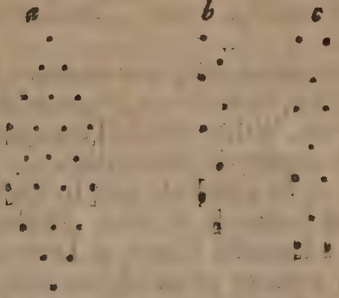
Another Specimen of the Wiſdom of the God of Nature, may be ſeen in the regular ſituation of Branches, and the orderly eruption of Buds, upon every Vegetable; for, notwithſtanding the report of my Lord *Bacon, Nat. Hiſt. Cent. 6. Obſerv.* 588. *That Trees and Herbs in the growing forth of their Boughs and Branches, are not figured, and keep no order, but that when they make an eruption, they break forth caſually, where they finde beſt way in their Bark and Rinde*: I finde my ſelf neceſſitated to refer that to an exceeding Wiſdom, which his Lordſhip refers to chance and caſualty: For if I obſerve aright both Buds and Leaves, and all eruptions, ſtand ſo on every Vegetable, as to ſerve moſt fitly for moſt neceſſary ends.

As to Leaves, the Learned Doctor *Brown* hath made the Quincunx famous, which may with as great aptneſs be applyed, and, I think, more univerſally to the ſcituation of Buds, or Germens.

This Figure had its name from the numeral Letter V. becauſe the points therein, are the ſame with the points or Angles in the ſaid Letter, and becauſe that as the Letter is capable of infinite multiplications, ſo is the Figure, and both in not unlike faſhions: The number thus, V.X.XX.XXX. the Figure thus,



Of this Quincunx I ſhall propoſe three ſorts. 1. The thicker, as in the Figure *a*. The thinner and leſs full of points, are either obliquely ſet, as in the Figure *b*. or more ſtrait, as in the Figure *c*.



The moſt thick ſort of Quincunx hath its examples rather in Leaves then Buds, for after this manner ſtand the Leaves upon moſt Martagons and Lilies, divers Spurges, and Sedums, on which it is moſt viſible, when the Plants run up to Seed. Trickmadam, Spurge-Laurel, Marſh-mallows, when the ſtock is exceeding ranck and big, for otherwiſe it is ſufficed with the regulations of the third Figure: The leaves of Firre-tree, Pine-tree, *&c.*

The ſecond, or oblique and ſingle Quincunx, may for the moſt part be obſerved, both in the Buds and Leaves that ariſe from Trees, and ſuch other Plants whoſe Stalks are round; as in the Oak, Elm, Haſel, Apples, Plums, Cherries, Pears, Willows, Sallows, Oſiers, Black-thorn, White-thorn, Gooſ-berries, Currants, Roſes, Fenel, Cichory, Thiſtles of moſt ſorts, Docks, Bur-docks, Sothern-wood, Rue, Se-

ſeli

ſen-Æthiopicum, Sweet-maudlin, Common-mercury, Dulcamara.

The third direct and oblong Quincunx is moſt obſerved in Plants of a ſquare ſtalk, as Water-Betony, Fig-wort, Lavander, Mints, St. Johns-Wort, Clowns-All-heal, Rhus-Myrtifolium, Mother-wort, Nep, Colus-Jovis.

Yet tis not unfrequently ſeen on other Stalks alſo, as the Sycamore, Elder, Maple, Dog-tree, Aſh, Hyſope, Nettles, Hemp, Willow-weeds, Tree-Spurge, French-Mercury, Scammony of Montpelier.

And it is to be obſerved, that in divers of thoſe Plants whoſe Stalks are ſet with Joynts, and thoſe Joynts with a beautiful Circle of Leaves, proper to each Plant, contrary to the Quincuncial ſcituation, the Germens, notwithſtanding, are found to follow the order of this laſt mentioned Quincunx, as may be ſeen in Madder, Gooſ-graſs, Ladies-Bed-ſtraw.

Or if that order be left, yet it is not left to the diſadvantage of the Plant, but generally it hath in exchange ſome other handſome and proper method of Leaves and Buds. Thus *Linaria-Quadrifolia*, hath on each joynt three, four, five or ſix oppoſite Leaves, & under each Leaf a Germen, which ariſe to Branches, uniformly ſet upon the ſame round Stalk.

And as to the particular make and frame of thoſe Plants, which in the ſtanding of their Leaves cannot be ſaid to follow the order of any Quincunx, yet they, inſtead of thoſe elegant Teſſellations, are beautified otherwiſe in their ſite with as great curioſity. I cannot think of a Plant, according to the ordinary eſtimation of men, that is more contemptible then that which grows ordinarily in Bogs, or miry Ditches, and is called Great-Horſe-tail; yet if any man pleaſe to diſartuate the whole, and take particular view both of the parts and conjuncture, they will finde the frame exquiſite enough to deſerve a better eſteem; for both Stalks and Leaves are made up of divers pieces, framed, as it were, in joynt work; all which pieces bear exact proportion each to other; and each receives other by indented terminations, which form very beautiful Coronets on the pieces ſo received; then at a convenient diſtance, above each of theſe Coronets, there ariſeth a very beautiful Circle of Leaves, and theſe very Leaves are made up of hollow pieces articulately, and proportionably joynted, in imitation of the elegancy of the joynts of the Stalk it ſelf.

And generally the Leaves that ſtand not according to the Quincunx, either ſtand in joynts, in the faſhion of the Burgonion Croſs, as on Croſs-wort; or in a Circle, as on moſt ſorts of Madder, Ladys-bedſtraws, Woodroofs; or in ſome other profitable, fit and beautiful poſiture: And though in theſe creeping and entangled Plants, irregularities are not unfrequently ſeen, yet even in theſe irregularities themſelves, there often eems to be a greater curiouſneſs and moſt proper order; as particularly, Madder is generally tetragonal, nd notwithſtanding its circular border of Leaves, uſu-lly ſends forth Buds, according to the manner of Mints, and other Plants of a four-ſquare Stalk: This I have ſometimes ſeen in many of its Branches to vary and turn hexagonal, or to have a ſtalk with ſix ribs, upon which declenſion the order of the Germens was hus moſt fitly altered; upon each rib or angle there was always one leaf, and upon every other rib, a germen under the leaf; which I found ſo placed, that no ne rib did bear the Bud in the two ſucceeding joynts; o that if in the firſt joynt, the three Buds ſtood on the firſt, the third, and the fifth ribs, then in the ſecond joynt, the Buds ſtood on the ſecond, the fourth, and the ſixth, and ſo interchangably to the very top.

Now by theſe ſcituations of the Buds, according to theſe Obſervations, it always is ſo found neceſſarily to be, that if two Buds ſtand on the ſame joynt, as in the third Quincunx ; thoſe that ſtand on the ſame heighth, keep always the contrary ſides ; and further, if the two lowermoſt ſtand North and South, the two next immediately above them ſtand Eaſt and Weſt. And in the ſecond, or oblique and ſingle Quincunx, when the Buds ſtand not two at the ſame heighth, the ſecond ſtands on the oppoſite ſide to the firſt, and the fourth to the third ; and then likewiſe, if the firſt and ſecond ſtand Eaſt and Weſt, the two next above them ſtand North and South.

I may give notice that to finde theſe methods, and to expoſe them to the eye, a profitable way may be to clip off the ſtalks of the leaves near the Branch, eſpecially in the firſt and moſt thick ſort of Quincunx ; in the ſecond more ſingle Quincunx, it may not be amiſs to ſlit the Bark and take it off, for it being laid plain and flat, the Quincuncial order will the better appear ; the third ſort is viſible to the eye, as the Plant grows.

Care alſo muſt be had, that obſervation be made on ſuch Plants whoſe ſtalks are not twiſted, for the twiſting of it brings the Leaves and Germens out of order : There may beſides theſe, ſome other methods appear not here mentioned, but even in them, he that pleaſes to conſider them, I doubt not, will finde conſtancy for the moſt part to their rule ; or if they have no rule, there may likewiſe a reaſon be found why it was good they ſhould be without.

But it is moſt certain, that theſe are the general methods, and theſe contrivances of the eruption of Buds, ſerve for divers excellent ends exceeding fitly, and ſo are arguments, (how poor and inconſiderable ſoever theſe Obſervations may ſeem) that they came not out thus by the lucky juſtlings and ſtumbling of blinde chance, but by the Providence of a moſt Powerful, Skilful, and Wiſe Artiſt and Author. For they ſerve firſt to procure a fit and proportionable ſhade for the Stalk and Fruit; neither of which in their tenderneſs,can endure the ſcorching Sun-beams, for by keeping this method and order, they communicate their ſhade to all parts of the Tree or Plant; whereas,ſhould they break out in a diſorderly faſhion, ſome parts of the Plant, and ſome Fruit would be expoſed to all weather, where no Buds or Leaves come forth; other parts would be too much ſhadowed by the two thick eruption of Buds. This order likewiſe ſets out the Boughs and Branches of each Tree into ſuch poſitions, that one may not eaſily fret upon another, or gall its neighbor, but grow in a diſtinct room, every Branch having his proportionable allowance in that circumference which the whole Tree akes up, whereby it may, without any impediment o others, grow to a convenient bigneſs; otherwiſe ame many Buds out together without method, they ould never arrive at any bigneſs in their future growth, nor attain to good Fruit, or pleaſant Leaves nd Flowers,but would run out into ſuch thick Crows-Neſts, as I have obſerved ſometimes to happen in Plum-Trees by an error or miſchance of nature, in he parturition or bringing forth of the Germens. The obſervation likewiſe of theſe methods muſt needs e of uſe to the Equilibration and uprightneſs of

Trees,

Trees,for ſhould all the Boughs break out in one place, or on one ſide, the heavineſs of that ſide or part, would bend down the body into a crookedneſs,and deprive it of that uprightneſs and ſtraitneſs,which is the moſt uſeful ſite of moſt Plants; and thoſe that are without theſe regulations, are generally ſuch as are made to grow upon and twiſt about other things, and not to bear up themſelves, as Bind-weeds, and the like.

And now I am come thus far, there comes into my minde that excellent Animadverſion which the moſt wiſe King made, when he had conſidered the ſeveral Purpoſes, Travels, Buſineſſes, Changes and Overtures, which happen to us poor men while we are under Heaven, in their ſeveral Seaſons; as particularly, in the days of our Birth, and the days of our Death,in the days of our Planting or being Planted, and thoſe of our Plucking, or being Plucked up: When Men get and Increaſe their Eſtates, and when they Looſe, grow Bankrupt and are undone; in the days of their Jollities, Dancings, Lovings, Wooings and Embracings; as likewiſe in thoſe cloudy and dull Seaſons, when ſatiety of Enjoyment, indiſpoſition of Body, or other unhappy accidents, has begot Peiviſhneſs and Loathing; and when Tears and Mourning contriſtate all their glory and beauty: Concerning the ſeaſonableneſs and fitneſs of all the Eſtates of men, their conditions, accidents and diſaſters in their ſeveral times, this is his obſervation, *Eccl.* 3. *That he had ſeen the travel which God had given the Sons of men to be exerciſed therewith*, and found, that God by his providence had made every one of the things made, *beautiful in its time: Moreover, that he had ſet the age in the middle of them*, yet ſo, that *no man of them* *can finde out the work that God maketh from the beginning to the end.*

I ſhall not Apologize for tranſlating העלם the age or בלבם in the middle of them, becauſe I know the words, and methinks the ſenſe and context bear it beſt, but ſhall beg leave by a paralleliſm to apply it to the preſent matter; the placing, not the timing of things, and to expreſs my thoughts thus: That God has made every thing beautiful in its place, order and ſcituation, and particularly every part of every Vegetable, and has alſo ſet the world ſo curiouſly wrought and modell'd, in the middle of us, yet ſo, that by reaſon of our various affairs and buſineſſes, and other fancies, no man can finde out the work that God hath made from the beginning to the end.

Laſtly, I muſt beg leave to make the ſame concluſion and Appendix to the Obſervation, that the King has there appoſ'd to his, (*viz.*) That the true and onely uſe that can be made of thoſe elegancies and beauties which in every aſpect ſuggeſt themſelves unto us, is no other, but that we *Rejoyce in them* and in their Maker, *and do good in this life.* I mean, that we puzzle not our ſelves over-much, nor diſcruciate our Spirits to reſolve what are the cauſes, and what the manner of cauſation of the apparent effects of Gods great power, any further then as our labour may ſerve for thoſe excellent and firmly together interwoven ends of rejoycing and doing good, and the rather, becauſe of the experiment which this moſt wiſe Prince, who was helpt by the great riches of his then puiſſant Kingdome, (and ſo not impeded by thoſe wants that uſually diſcomfit private perſons in ſuch enquiries) made himſelf and publiſhed concerning his own ſearch, *Eccl.* 1. *That he gave his heart to*

ſeeke

ſeek and ſearch out by Wiſdome concerning all things that are done under Heaven, and found this to be a ſore travell, that God had given the Sons of men to be exerciſed therewith, And further, That *with much wiſdom there is much vexation, and he that increaſeth knowledge, increaſeth ſorrow.*

FINIS.

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